

POPULAR Computing WEEKLY

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Saga to launch cheap Z80 micro

COLOUR FEATURE



The Image System on
Amstrad CPCs – p15
Plus

Hardware – InterGem disc
interface for the PCW8256

Preview – Druid from
Firebird

● Saga is to launch a Z80-based micro in the next few months.

● The machine will have printer and disc drive bundled, and will be aimed at the serious user.

● It will be priced in the Amstrad bracket at £299 excluding VAT.

Full details below and inside SPECTRUM add-on manufacturers Saga plans to launch a new micro, the Saga Compliment, in the next few months. According to David White of Saga, the machine's launch date hasn't yet been fixed, "but I could launch in in four weeks time if I wanted to", he says.

He describes the machine as a "complementary system", but is reticent as to what this

means. "It's being billed as a very powerful word processing station", he says. It will be Z80 based, but definitely won't be Amstrad compatible, and White is unconvinced of the attractions of the Amstrad machines' CP/M capability. "CP/M programs still have to be ported across to the Amstrads, and you can still run into limitations on Ram and so on. Amstrad hasn't quite opened up everything."

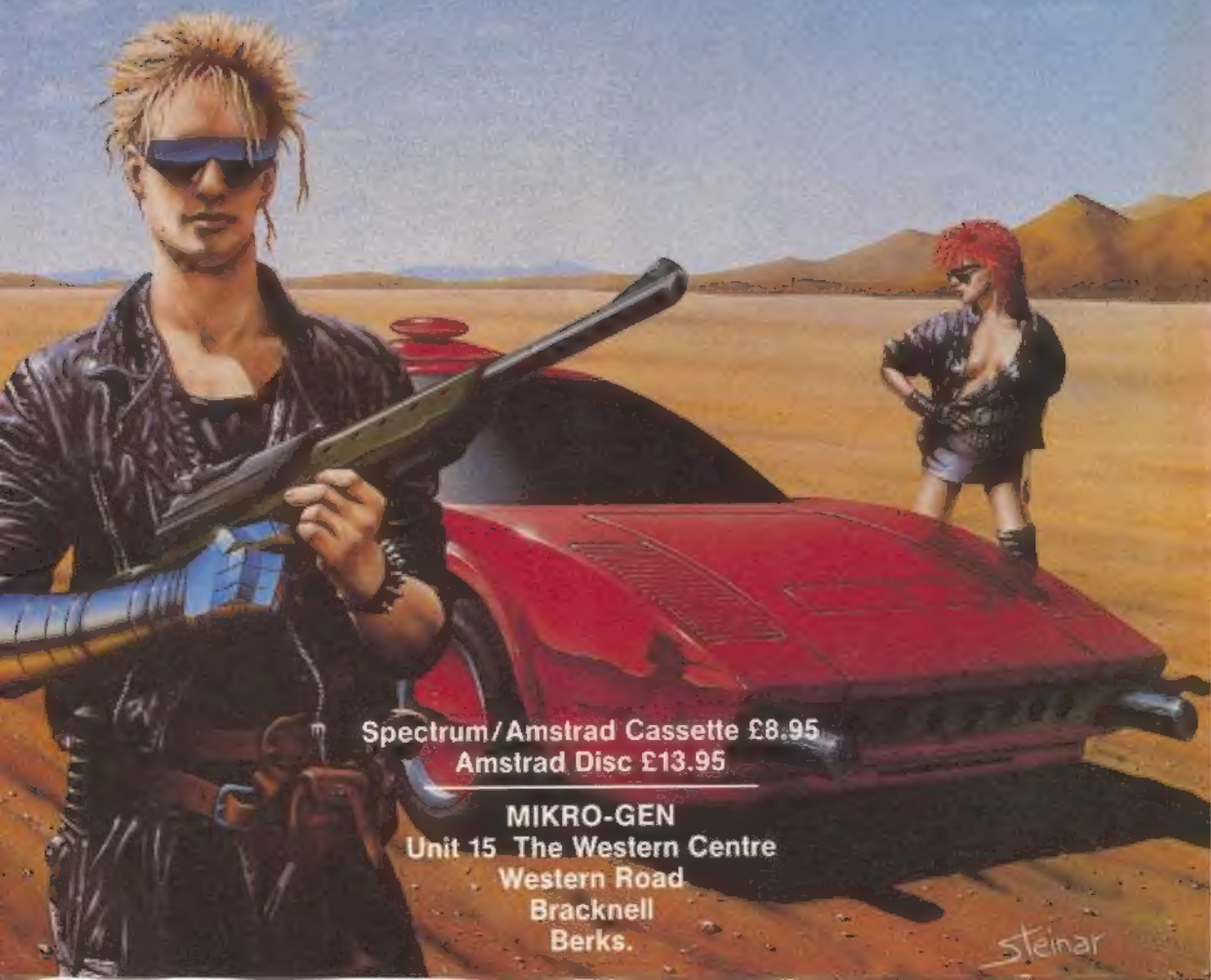
The Compliment is, he says, "an all in one workstation", and its price brings it in below the Amstrad PCW 8256, and although it won't come with a monitor it could still work out cheaper. White however doesn't see it as an Amstrad basher, and expects it to sell steadily even if Amstrad were

Continued on page 4 ►

THIS WEEK'S NEWS

- Opus joins the PC clone set
- Tatung's new Einstein to be launched at PCW show
- Acorn's Baby BBC – more details

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Steinar

How compatible is the new BBC?

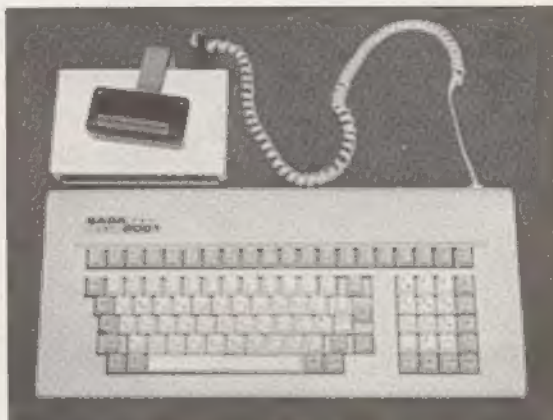
FURTHER details are emerging about the new Acorn machine due out this Autumn. The Baby BBC - also known as the BB - will have 128K Ram, and will be essentially a Master sporting a version 5.0 operating system, Basic version 4.0 and ADFS version 2. It will not however be compatible with earlier DFS versions, and according to developers working on it doesn't appear to support sideways Roms.

The machine does, however, pull-down menus, and has radically improved graphics facilities. But these, however, seem to be memory guzzlers, and it

appears that in Mode 1 only 28K of the machine's notional 128K of Ram is available for programming.

There is also some controversy over the machine's compatibility. Acorn insiders maintain that it is highly compatible with earlier BBC machines, but one software developer was sceptical, estimating compatibility at around 30 per cent.

Acorn is in any event having a collection of Acornsoft and third party games converted for bundling with the new machine, so it certainly cannot be 100 per cent compatible.



Saga's 2001 - will the micro look like this?

Saga plans new Z80 based computer

◀ continued from page 1

to reduce the price of the 8256 at the launch of its PC compatible.

The disc drive is to be 3 1/2 inch, and will have a capacity of 256K, while the printer will have a speed "in excess of 100 cps", an NLO mode and will be Epson compatible. Considering Saga's history some measure of compatibility with the Spectrum would seem logical, but White refuses to comment on this - nor will he reveal the amount of Ram the Complement has.

This is Saga's first venture into micro manufacture, although there have been rumours that the company in-

tended to make the plunge for some months now. The move is quite clearly a consequence of Amstrad's purchase of the Sinclair name - Saga is best known for its Spectrum add-on keyboards and *The Last Word* Spectrum word processor, and the advent of an Amstradised Spectrum sporting proper keyboard and directed at games players means Saga's traditional market will dry up.

The Complement could however be produced quite cheaply if Saga based it on one of its range of keyboards, as this could cut the cost of designing and producing the machine's plastic moulds.

Power supplies from Peaksoft

PEAKSOFT is to launch a new heavy duty range of computer power supplies on August 18. The supplies are guaranteed for two years, and can be returned for service or repair for a fixed price any time after that. The first models will be for the

Commodore 64 (£24.95) and the Electron (£14.95), and these will be followed by Dragon 32, 64 and 128 versions at £16.95.

Details from Peaksoft, 48 Queen Street, Balderton, Newark, Notts NG24 3NS (0636-705230).

Micronet ends up behind bars

THE Midnight Micronetters Club, the London-based organisation used by Micronet members as an excuse to go to pubs, is taking to the road from August 18, and the organisers now appear to be using it as an

excuse to go to pubs five nights in a row. The meetings are as follows: August 29 - Birmingham, August 30 - Manchester, August 31 - Carlisle, September 1 - Edinburgh, September 2 - Aberdeen.



New boozier group...

Cut-price add-ons for the Telestrat

WE SOFTWARE, which recently announced that it was importing the Eureka Informatique/Oric Telestrat into this country, intends to offer discounts on Oric hardware for approximately the next two months.

The Eureka/Oric 3 inch disc drive with bundled Sedoric double density Dos is reduced from £269.65 to £239.65. Oric V23 modem with interface and Prestel software is down from £64.95 to £49.95, while the Cosmos printer is reduced from £309.95 to £269.95 and the pro-

grammable joystick interface is reduced from £37.55 to £32.55.

All offers are subject to availability of the relevant items of stock.

Oric, which was founded in the UK at the height of the consumer micro boom, was sold to the French company Eureka Informatique over a year ago.

The Telestrat is the fruit of Eureka's development work on the Oric, Atmos, and is an Atmos-compatible machine that leans heavily on comms.

Details from WE Software, Foley Bank, Worcester Road, Great Malvern, Worcestershire WR14 4QW (06845-69059).

Commodore's show shuffle

CONFUSION reigned last week over Commodore's presence at this year's PCW Show, with the micro manufacturer's PR company at first unsure, then steadfastly maintaining that Commodore would not be attending then changing its mind again. Commodore itself however said that it would be attending, and the company does actually have a stand at the show booked.

It however appears that the stand will be relatively small, and as at the recent PC User Show will concentrate on business, with the Amiga and Commodore's PC compatibles on display. The company should

also launch the 64C onto the UK market there, but may be worried about being overshadowed by Atari. The latter has booked large quantities of space at the show, and is thought to be planning a major blitz.

A 'show/no-show' attitude is becoming something of a tradition at Commodore. The company did finally turn up to the CES show in Chicago this Spring but only after a bout of semi-public agonising. A spokesman said the company hadn't made a firm decision to turn up to any further shows, but we know what they said about PCW...

New-look Einstein micro gets an enlarged brain

TATUNG's follow-up to the Einstein, the Einstein 256, is to be launched at the PCW show in September. As predicted in *Popular Computing Weekly* it is to be an Amstrad-style design, running CP/M and including a single 3 inch disc drive.

Tatung claims the machine is completely compatible with earlier versions of the Einstein,

and in addition has stereo sound, video, mouse, tape and light pen inputs and twin joysticks ports. It also has 512 colours, resolution of 512 x 424 and will support multi-coloured sprites.

Tatung won't reveal the price, apart from saying it will "retail at the lower end of the price scale".



Carry on screening...

Memotech's multiple monitor

FRESH from its rescue Memotech Computers is launching a video wall control system that will allow conferences, discos and exhibitions to assemble pictures made up of anything up to 100 monitors. The device, the Distributed

Digital FrameStore, is based on a Memotech computer, and as it's designed to emulate a Centronics printer is programmable in MTX Basic. A 4x4 wall controller comes in at £6,000, while the one above is a few dollars more.



The PC2 - a magnum Opus.

Opus to launch PC compatible

OPUS is climbing onto the PC bandwagon with the Turbo range, due for launch at the PCW show and starting at £575 (including VAT). The machines have a clock speed switchable between 4.77Mhz, the IBM PC's speed, and therefore the one that produces the highest level of compatibility, and 8Mhz. The base model comes with a single 360K floppy drive, 256K Ram, Hercules-compatible graphics card and monochrome monitor.

Other standard features are parallel printer port, eight expansion slots, battery backed

clock calendar, keyboard lock and joystick port. The machines can be expanded to house one megabyte on the motherboard, and will initially come in four different configurations.

In the home field Opus is more generally known for its add-on disc drives for the likes of the Spectrum, but its appearance in the PC market shortly after Spectrum Group's entry, with the Bondwell, indicates that Amstrad's PC will face stiff competition from several microcomputer companies on its eventual launch.

Price scoop from Proops

ELECTRONICS discount warehouse Proops has a bargain for people who want a cheap introduction to micros. The company has obtained 90 Dragon 32s, 30 of which work, with the remainder suffering from what a spokesman called "minor faults". The working models are to be sold on a first come first served basis to personal callers only for £23, while the defective models, which are all minus power packs and the top

of the case, (but see page four for Dragon power supply details) are being knocked down for £15.

Most of the machines come with manuals, although as spares and support for the Dragon are thin on the ground this is about all you're liable to get.

Details from Proops Distribution, Heybridge Estate, Castle Road, London NW1 0J1-267 6911).

Micro museum at show

LEVEL 9 is to celebrate its fifth birthday at the PCW Show by dressing its stand up "in the form of a museum". The company also intends to show how hardware has improved over the past five years by staging a

"computer battle" between the Nascom computer (circa 1981) and the Amiga (1986).

The Amiga should win, unless of course two rival champions are to bludgeon one another to death with them...

Commodore sells suite for Amiga

COMMODORE is releasing *Logistix*, an integrated business package developed for the Amiga by Grafox. The package adds time management to spreadsheet, databases and graphics functions, and provides project planning models, critical path analysis support and computerised wall planning.

The package can also read in files from 1-2-3, *Supercalc* and *dBase*, and has been reconfigured to take advantage of the Amiga's multitasking and graphics capabilities. It costs £282.

Elephant now wears ribbons

DENNISON has extended its range of Elephant Memory Systems computer ribbons with the ER112, ER113 and the ER236. The ER112 fits the Commodore MPS 801, while the ER113 can handle the MPS 803, Brother M1009 and Centronics 3101 printers. The ER236 is a multistrike ribbon which can be fitted to the Commodore MPS



802, 1526 and 4023 and the Mannesmann-Tally MT-80. The ER112 is £3.75, the ER113 £5.98 and the ER236 £5.10. Our illustration shows the three positioned before an Underwood typewriter, a classic circa 1926, but regrettably ill-equipped to handle any of them.

Details from Dennison, Colonial Way, Watford WD2 4JY (0923-41244).

68000 board from Cumana

CUMANA's new products for the PCW Show will include an OS-9/68000 upgrade board for the BBC B, price £817.60, sin-

gle and dual 3½ inch drives for the Atari STs (price £159.50 and £269 respectively), and a £79.90 disc interface for the QL.

The 68000 board is described as a high performance real time operating system incorporating multi-tasking capabilities and a powerful graphics kernel, while the Atari drives have a capacity of 1Mb each. The QL interface can support up to four drives in double density mode, and can use 40 or 80 track, single or double sided 3½ inch or 5¼ inch drives. It is also compatible with Cumana's range of BBC drives.

Details from Cumana, The Pines Trading Estate, Broad Street, Guildford, Surrey GU3 3BH (0483 503121).

64 graphics pack is enhanced

CULTON Sales and Services has added a text mode insert facility for its *64 Drawing Board* graphics utility for the Commodore 64/128. The facility allows text from a word processor file to be inserted automatically into a defined area on the drawing sheet. The *64 Drawing Board* also allows the use of an

unlimited range of fonts from eight by one pixel (handy for Morse code faces) to 40 by 24 pixels.

Details from Culton Sales and Services, 34 Mount Street, Dorking, Surrey RH4 3HX (0306 885138).

Typing tutor for Amstrad PCW

COMPUTER One has launched a new typing tutor for the Amstrad PCW machines. It consists of manual, 11 lessons and a Hangman-style learning game. It costs £24.95.

Details from Computer One, Cambridge Science Park, Milton Road, Cambridge CB4 4BH (0223 862616).

Manual is a Plus for CP/M

THE *Official CP/M Plus Handbook* is now available from Heinemann, price £25. It's designed for use with the Amstrad CPC 6128 and PCW machines, and consists of Digital Research's CP/M Plus documentation.

Details from William Heinemann, 10 Upper Grosvenor Street, London W1X 9PA (01-493 4141).

Diary Dates

JULY

24-27 July

Acorn User Exhibition

Barbican Centre, London

Details: Hardware, software and peripherals for the Electron, BBC micro and Master machines.

Trade only 10am-1pm on 25 July.

Price: £3 adults, £2 children, £1 discount for advance sales.

Organiser: Editionscheme, 01-349 4667.

SEPTEMBER

3-7 September

Personal Computer World Show

Olympia, London

Details: Software and hardware for home, educational and business computer users. For the first time this year the show is to be organised in three separate halls - business, games and education.

Price: £2.

Organiser: Montbuild, 01-487 5831.

12-14th September

8th Official Commodore Computer Show

UMIST, Manchester

Details: A wide range of Commodore hardware, software and peripherals. Formerly the Commodore Horizons show.

Price: £3 adults, £2 children, £1 discount for advance booking.

Organiser: Database Exhibitions, 061-456 8835.

26-28 September

Electron and BBC Micro User Show

UMIST, Manchester

Details: Software, hardware and peripherals for the Electron, BBC micro and Master machines. Produced by Acorn.

Price: £3 adults, £2 children, £1 discount for advance booking.

Organiser: Database Exhibitions, 061-456 8835.

OCTOBER

3-5 October

The Amstrad Computer Show

Novotel, London

Details: Home and business software and hardware for the Amstrad range of computers.

Price: £1 adults, £2 children, £1 discount for advance booking.

Organiser: Database Exhibitions, 061-456 8835.

30-31 October

Hampshire Computer Fair

Guildhall, Southampton

Details: Business computers and communications.

Price: Free entry by business registration.

Organiser: Testwood Exhibitions, 0703 31557.

NOVEMBER

7-9 November

Electron and BBC Micro User Show

New Horticultural Hall, Greycoat Street, London SW1

Details: Hardware, software and peripherals for the Electron, BBC micro and Master series.

Prices: £3 adults, £2 children, £1 discount for advance booking.

Organiser: Database Exhibitions, 061-456 8835.

21-23 November

9th Official Commodore Computer Show

Novotel, London

Details: A wide range of Commodore hardware, software and peripherals

Prices: £3 adults, £2 children, £1 discount for advance booking.

Organiser: Database Exhibitions, 061-456 8835.

24 November

The 6809 Christmas Show

Royal Horticultural Hall, Westminster, London

Details: Dragon software and peripherals.

Price:

Organiser: Microdeal, 0726 6820.

Prices, dates and venues of shows can vary, and you are therefore strongly advised to check with the show organiser before attending. *Popular Computing Weekly* cannot accept responsibility for any alterations to show arrangements made by the organiser.

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ACE	9.95	6.99	Toad Runner	8.95	6.99	Menagerie II	5.95	4.99
Jack The Nipper	7.95	5.75				Trance	9.95	6.99
Gracen AD Creator	22.95	14.99				Laser Games	14.95	11.99
Born Jack	1.95	1.75	COMMODORE 64/128			Silent Service	9.95	6.99
Green Barret	7.95	6.75	PSX's	9.95	6.99	Doomsday's Revenge	9.95	6.99
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Equinox	9.95	6.99	Soft Construction Set	12.95	9.99	Sabotage	8.95	6.99
Killer Tomatoes	7.95	5.75	Tubular Bells	9.95	6.99	Thru	1.99	1.99
Biggins	7.95	5.75	Shogun	9.95	6.99	Wt Karate	6.99	4.99
Biggles	9.95	6.99	Starquake	8.95	6.75	Caution II	9.95	6.99
Starquake	14.95	11.99	Way of the Tiger	9.95	6.99	Sam Fox	9.95	6.99
Tan Taka	7.95	5.75	Biggles	9.95	6.99	Spindizzy	9.95	6.99
Pyramus	7.95	5.75	Germany 85	9.95	6.99	Soft Construction	9.95	6.99
Sam Fox	8.95	6.99	Krusch	9.95	6.99	Board of the Rings	9.95	6.99
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QL printer help

With reference to the article on using a Brother EP44 as a line printer to a Sinclair QL in *Popular* May 1, I would like to offer the following install - bas edition.

Printer to be installed - Brother HR15

Port - Ser. 1

Baud Rate - 1200

Parity - None

Lines/Page - 66

Chars/line - 80

Cont. forms - No

End of line code - CR,LF

Preamble code - Esc,CR

Bold on - Esc,W

Underline on - Esc,E

Subscript on - Esc,U

Superscript on - Esc,O

Postamble code - None

Bold off - Esc,&

Underline off - Esc,R

Subscript off - Esc,D

Superscript off - Esc,D

The EP44 should be set up as follows:

Baud - 1200

New line - CR + LF

Star Letter

Short-sighted

I have just read Mike Lloyd's Ziggurat in *Popular*, July 17, and must conclude that he is short-sighted and confused.

He says that there are two paths that computer manufacturers can take - improved Basic machines, about which more later, and secondly 'clean' machines with no resident language software.

This second type of machine will probably dominate in the future with the Amiga and Atari STs leading the way. This type of machine has already been around for a long time (RMZ3802, for example) and is the best solution for getting away from

language specific machines.

His other suggestion, though, that Basics be improved is rather disturbing. Most people buy computers to learn about computing (although the vast majority end up playing games, and why not? After all, that's what they're best at), but they will learn little from Basic however 'structured' it may be.

Their ultimate goal may be to work in the computer industry but very few employers take on people purely as Basic programmers.

If you want structure and speed, why not try Pascal? Then move on to Ada or Cobol, both of which are easy to pick up after Pascal.

The language would, of course, be non-resident and held on some form of backing store.

The part of his article I objected to most was the suggestion that Basic be used to produce *Manic Miner* type games. Who wants those? If it can't produce games like, say, *Impossible Mission*, what use is it? The more sophisticated the end result, the better. In the next few years, someone will produce the ultimate game designing tool and languages will become redundant for writing games. Until then, Mr Lloyd, leave it to freaks like Tony Crowther, David Crane et al, who seem fairly happy using machine code.

Simon J Mills
London SW12

Bit length - 8

Code - 7W

Parity - N

ER - 1Y

Using this printer driver gives both sub and super

scripts, and when underlining saves a lot of ribbon, as the

continued on page 10►

Ziggurat

What happened to vector graphics?

Every now and then it's interesting to sit back and think about some of those wonderful computer ideas that never quite made it. Light pens are a particularly good example; they sound like a lovely idea, but only seem to work well with elaborate hardware far beyond the reach of most home users. A related concept is vector graphics, an alternative display idea that once seemed to offer a lot but is still almost exclusively the province of amusement arcades and professional design departments.

Vector graphics produce the type of displays used in *Battlezone*, *Asteroids*, and many other wire-frame graphics arcade games. Essentially, the entire display is produced by a single beam of electrons which traces the outlines of objects fifty or so times a second. Since the beam only has to move to cover essential details, the circuitry of these displays can be considerably simpler than a monitor or TV set, and games can be unusually fast.

By comparison, a normal monitor or TV set uses Raster graphics; electron beams scan the entire surface of the display tube repeatedly, even in areas where nothing is happening. Where a normal monitor display is broken up into pixels, a vector line is completely smooth, regardless of angle, and is as thin as the beam of electrons that produces it.

Essentially, the difference between a

normal monitor and a vector display is similar to the difference between a dot matrix printer and a plotter; a dot matrix printer tries to draw a line as a series of blobs which may not fit precisely, a plotter will draw a straight line. For most vector displays a line is simply defined by its end points, with the beam tracing the distance between them, a curve is drawn as a series of short straight lines linking coordinates, the smoothness depending on the number of linked dots.

Because it's easier to draw straight lines than curves on a vector display, most arcade games tend to feature fairly angular displays; however, with more computer power and better software near-perfect circles and curves are attainable.

Apart from arcade games, the main use of vector graphics is in computer aided design (CAD) work. Vector displays make accurate scaling of lines easy, and are well-suited for diagrams.

The main disadvantage of vector graphics is that displays are usually limited to a single colour. Attempts to get round this (by having a colour screen and several electron beams) tend to be complicated and somewhat less clear than a single-colour tube. There have also been a few hybrid vector-raster displays; these are usually extremely expensive.

So far there's only been one attempt to introduce vector graphics to the home

market. An American company introduced the Vectex home computer in 1983; essentially, it was a dedicated vector graphics game machine, consisting of a monitor and simple player controls, which took plug-in game cartridges. The most interesting feature of this machine was its small vertical screen, roughly the size and shape of an A4 sheet of paper. The Vectex was fast and many of its games were novel; but, since then there have been no readily affordable vector displays; the cheapest I've seen is an IBM compatible add-on, costing well over £1000, which needed a special interface card and ran one CAD software package.

Obviously vector displays have their problems, and the main one is probably the lack of a standard. For monitors there are four or five main types of interface, with RGB and composite video most common, but for vector graphics each manufacturer seems to use a new specification.

If manufacturers could agree a standard, and persuade more computer and software companies to take an interest in the idea, we might see vector displays dropping down to home user prices. At first most of the software would probably be for CAD, but in the long run a new type of display might spark hundreds of fresh programs, from games to entirely new applications that can't readily be imagined.

Marcus Rowland

Letters

underlining is done on the same strike as the letter. This could probably be bettered; I stopped when I got this far, as I was too exhausted to continue.

Does anyone know if it is possible to use the printer memory as a printer buffer, or of any way to bypass the character set to print graphics?

May I also offer the following small hints. To stop the printing of the page number at the end of a short letter simply set the page length to zero. The QL character set looks particularly good on manuscript size paper, and it is useful to set up letter-headings for different sizes of paper with margins and tabs and save them to a spare drive.

Many thanks for your support of the QL. Long may it last.

Alastair Smith
Edinburgh

Dir edit helpful

I am writing to congratulate yourselves and Alastair Scott for one of the most useful programs I have ever found in a magazine. I refer to the program *Dir Edit*, published in *Popular*, July 17.

Since typing in the program, I have edited my collection of discs and found some programs I thought I'd lost forever. Many thanks for the means of

recovering them.

I must confess, however, that there was one small matter which disappointed me, and that was the absence of the standard full stop between the file name and its suffix (as in *Progfile.Bas*). I have therefore modified my copy of the program as follows to support this feature.

The following lines should be added or amended:

```
570 ga$(a) = file$(a):gb$(a) =
LEFT$(ga$(a),3) + "." +
RIGHT$(ga$(a),3)
575 PRINT gb$(a); TAB(18);
530 ERASE file$(a), user, rw, sys, or, ie,
ga$, gb$
540 DIM file$(16), user(16), rw(16),
or(16), ie(16), ga$(16), gb$(16)
```

This one program has made worthwhile the purchase of your magazine which I have done since I bought my Amstrad 6128 last year. Thanks again.

G J Kent
Colchester
Essex

Call all Orics

I am writing to ask you through your Letters page if there is an Oric users group in Britain.

I have been given an Oric Atmos 48K computer keyboard, but I need a 9V Oric

transformer that changes 240V to 9V. I wish to know how much a new or second hand one would cost if it is possible to get them, or if any other SV transformer would fit.

I J Mackie
10 Beaufort Street
Chaddesden Est
Derby
DE2 6AX

Magazine madness

I wonder if you can help me? My predicament is last Christmas I sent in two articles relating to my computer to the main user group magazine for my machine. It eventually published them over the last few months. Since I sent them in I have moved address, but I have forwarded the group my new address and checked my old address for mail. It credited me with writing both pieces.

I have written a number of times enquiring whether I would be getting some compensation for my troubles. As yet I have had no correspondence whatsoever. I sent them into the magazine because it was looking for articles and I thought I would get paid for them. Since the magazine is copyrighted I cannot try and resell my material. What can I do? I feel as if some has taken advantage of me.

Note I haven't included the name of the user group as I am hoping it will come through and save the day for me.

A F Wilson
4 The Flat
Tangiers St
Whitehaven
Cumbria

Did the magazine state that it would pay you for the articles? Most user groups are voluntary organisations, run by people in their spare time, and they simply don't have the cash to pay for submissions.

On the other hand, however, as you have not been paid, you retain the copyright (ie, the magazine hasn't 'bought' the copyright from you) and are free to resubmit the articles to other publications.



"We're hoping to catching the Christmas market."

Puzzle

Puzzle No 219

"Here is a little problem for you," said Professor Otto Hex, to his final year students.

Picking up a piece of chalk he wrote the following words on the blackboard:

SQUARE PRIME

"Now what I want you to do," continued the Professor, "is to substitute the digits 1 to 9 for the letters in those words so that 'SQUARE' is square, and 'PRIME' is prime."

"Remember," he continued, "that the 'E' must represent the same digit in both numbers, as must the 'E'. And don't forget that you must not use a zero."

"And there's one more thing I must tell you before you can solve the problem. The letter 'P' is represented by the digit 1."

Unfortunately I didn't quite catch what he said. Can you find the solutions?

Solution to Puzzle 214

Answer: 1258861609 = 16397

We are looking for a square number containing nine digits in which the third and fourth digits are alike, as also are the second, fifth, and seventh. The rest of the digits are different. Such a number must be the square of a value in the range 10000 to 31622 and so the program tests these values. The square is converted to a string variable for the appropriate comparisons to be made (lines 40 to 100).

Those values which satisfy the conditions are

```
10 FOR N=10000 TO 31622
20 S=N*N
30 SS=STR$(S)
40 IF MID$(SS,2,1)<>MID$(SS,5,1)OR MID$(SS,2,1)<>MID$(SS,7,1) THEN 200
50 IF MID$(SS,3,1)<>MID$(SS,4,1) THEN 200
60 IF MID$(SS,1,1)=MID$(SS,2,1)OR MID$(SS,1,1)=MID$(SS,3,1)OR MID$(SS,1,1)=MID$(SS,4,1)OR MID$(SS,1,1)=MID$(SS,5,1)OR MID$(SS,1,1)=MID$(SS,6,1)OR MID$(SS,1,1)=MID$(SS,7,1) THEN 200
70 IF MID$(SS,2,1)=MID$(SS,3,1)OR MID$(SS,2,1)=MID$(SS,4,1)OR MID$(SS,2,1)=MID$(SS,5,1)OR MID$(SS,2,1)=MID$(SS,6,1)OR MID$(SS,2,1)=MID$(SS,7,1) THEN 200
80 IF MID$(SS,3,1)=MID$(SS,4,1)OR MID$(SS,3,1)=MID$(SS,5,1)OR MID$(SS,3,1)=MID$(SS,6,1)OR MID$(SS,3,1)=MID$(SS,7,1) THEN 200
90 IF MID$(SS,4,1)=MID$(SS,5,1)OR MID$(SS,4,1)=MID$(SS,6,1)OR MID$(SS,4,1)=MID$(SS,7,1) THEN 200
100 IF MID$(SS,5,1)=MID$(SS,6,1)OR MID$(SS,5,1)=MID$(SS,7,1) THEN 200
110 PRINT N,S
200 NEXT N
```

printed out. Of these values we need to select the one in which the letters in the name correspond with the letters in the name of the computer. That is, the first letter is a 'D', the second an 'O', and the fourth an 'E'.

Only the answer given will do this.

Winner of Puzzle No 214

The winner this week is Dean Bubleby, of Golders Green, who will be receiving £10.

Rules

The closing date for puzzle 219 is August 26.

MANDRAGORE



THE MAKING OF A LEGEND

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MSX and Spectrum



The InterGem interface will save you money

But, as John Lettice discovered, it may take some time

Once upon a time practically all real microcomputers used 5¼ inch disc drives, and practically all real microcomputer users deplored the fact. Your 5¼ inch disc, they said, was floppy (hence the name), large and susceptible to damage. The smart money was on disc standards changing over to 3 or 3½ inch, both of which were sturdier, and had the added advantage of being able to fit into a shirt pocket.

Those of us who, being minus shirt pockets, concluded that the future belonged to people clad in safari suits, and began stockpiling 5¼ inch discs, can now breathe again. Amstrad discs are currently so hugely expensive that it could make sense to fit a 5¼ inch drive to your PCW. And instead of spending £4 for a 3 inch disc you could spend £1 for a 5¼ inch disc. It's cheaper in the long run, and while it's arguably not cheaper in the short run it's also cheaper in the medium run.

"InterGem is basically a small piece of circuitry"

Bearing in mind the inexplicable failure of the all-powerful Amstrad to bring down the price of its discs to the level everybody else's discs sell at it was clearly only a matter of time before someone took steps to attach the Amstrad PCW to those ridiculous, vulnerable, antiquated and cheap 5¼ inch drives.

Gemini's InterGem interface is an attempt to do this, and takes the tried and tested path of twiddling the PCW's electronics around to the extent that it will accept BBC standard 5¼ inch drives.

InterGem is basically a small piece of circuitry designed to fit into the spare drive slot of the PCW 8256. It could be fitted to an 8512, but as it fits into the area occupied by the second drive this would be an expensive way of using it.

It comes in the form of a small circuit board designed to fit into the second drive slot, with the interface socket projecting out where the drive would normally be. Gemini recommends that it be fitted by an engineer, but the procedure is fairly straightforward and it's therefore feasible to fit it provided you're fairly DIY minded.

Following the installations manual, the first step is to take the back off the PCW. Once you've done this you need to cut through the six small plastic lugs holding the second drive cover in place, leaving a slot for the interface. A small hacksaw blade seems best for this job. With the slot

exposed the next step is to slide the interface into position from the front, then secure it. Doing the latter involves twiddling with screws and fixing plates, and requires something like six pairs of hands and a team of *Fantastic Voyage* style pixies - tricky, but it can be done.

Once you've got this far you realise your

"It will operate like a PCW second drive"

mistake, as the manual tells you to fix the cables from the inside of the PCW to the interface, and of course now the interface is fixed you can't see where the cables go. But after dismantling the whole shebang, cursing Gemini and attaching the cables your creation should be complete.

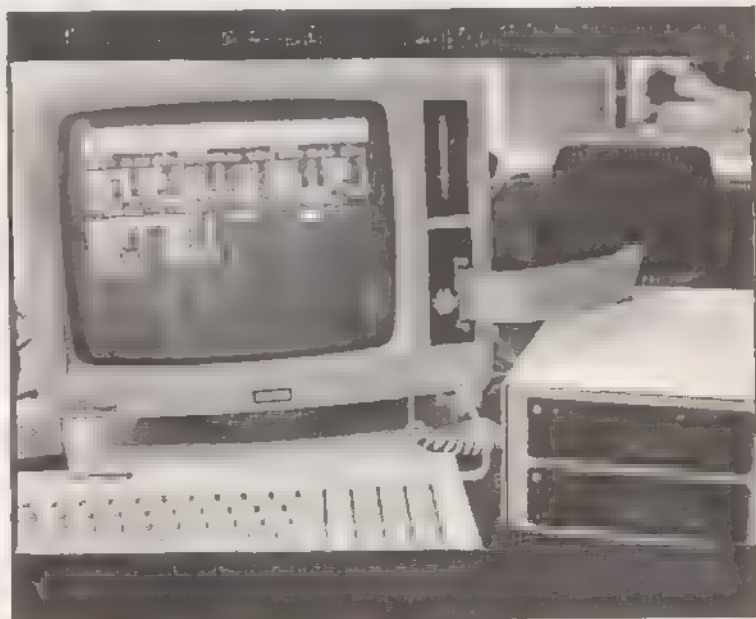
The completed edifice looks pretty much like a PCW, apart from the strange sockets emanating from the second drive slot. This consists of a connector for the ribbon cable leading to the drive and a power output capable of taking a plug for a standard BBC drive. The unit can cope either with this or with a BBC style drive with external power supply (the type used in this test). The interface can also deal with both 40 and 80 track BBC drives, although 40 track drives cannot be used with *Locoscript* or 80 track disc formats.

Once it's up and running it will operate just like a PCW second drive, but has the added frill of allowing you to transfer data between MSDOS (IBM PC), Concurrent CP/M, CP/M, CP/M 88 and BBC machines and the PCW. The utility disc included with the interface includes an impressive list of machines catered for, including obscurities like the Lynx, Einstein, DEC Rainbow and ICL machines too bizarre to mention. Obviously it wasn't possible to test this range, but those that won't work straight off should go with a little tweaking.

InterGem should also be able to deal with 5¼ inch CP/M programs straight off drive B, widening the PCW's software base to the less popular CP/M packages (which are only available on 5¼ inch disc) and to public domain software.

Overall the interface and the disc drive to go with it is a substantial investment, but assuming the price of 3 inch discs isn't going to drop in the near future (have you ever detected a kindly smile on Alan Sugar's face?) it should, in the long run, prove to be a money saver. Well worth thinking about.

Product InterGem interface Micro
Amstrad PCW Price £99.95 **Supplier**
Gemini Marketing Unit 21, Concorde
Road, Dianan Way Trading Estate,
Exmouth, Devon EX8 4RS (0395
285165).



Amstrad Exbasic is too roundabout

It goes without saying that although the Amstrad PCW machines have been sold as dedicated word processors, they are capable of far more.

Which makes it rather sad that Amstrad chose to bundle Mallard Basic with the machines. It's not that Mallard Basic is bad, but that it seems to have been designed to do no more than calculate compound interest and other piddling little business programs.

There are no graphics commands, and various control functions are implemented through torturous *Escape* sequences.

A partial remedy has now arrived from a new software company called Nabitchi - not

Japanese, as you may assume, but based in Liverpool.

Nabitchi's Exbasic adds 36 new commands to Mallard Basic, covering areas like graphics, cursor control, screen layout and so on.

Some of these are completely new to the Mallard dialect, such as circle, line, paper and ink commands. Others replace the escape sequences. For example, instead of *Print Chr\$(27); "E"* to clear the screen, you can use *Print "ICls."*

The new commands are all preceded by the inverted exclamation mark (*Extra-1* on the PCW keyboard) and concluded with the full stop.

Unfortunately, this makes typing them at the keyboard a finger-twisting business. Furthermore, the new commands are all *Printed*. So to draw a circle in the centre of the screen with radius 50 pixels requires a line like:

```
10 PRINT "ICIRCLE", 360, 125, 50
```

You can, of course, define the new commands as strings (*CS="ICircle."*) and use them that way, but this requires a fairly lengthy definition routine.

The other drawback is that patching the commands into Mallard Basic has made them extremely slow. Because of this Exbasic is totally inadequate for really detailed graph-

ics, or for animation.

Whether you'll want exbasic depends on how much programming you need to do. If you need a few basic graphics like bar and line charts, then Exbasic is probably adequate.

Serious programmers will do better with Digital Research's compiled CBasic, or another language altogether, or get to grips with programming the GSX graphics system.

Peter Worlock

Program	Exbasic	Micro
Amstrad PCW	8256/8512	
Price	£11.44	Supplier
Nabitchi, Merseyside Innovation Centre, 131 Mount Pleasant, Liverpool L3 5TF		

Power cartridge for the Commodore 64

KCS's *Power Cartridge* joins a long list of utility/operating system enhancements for the Commodore 64. Though a powerful machine, the 64 benefits hugely from added commands for disc handling, basic programming, printer control and so on, and the Robtek Turbo range, H&P Final Cartridge, and products from Evesham Micros have all attempted a remedy various aspects of the 64's shortcomings. The *Power Cartridge* includes most of the features found on these existing products.

The cartridge features live main areas of use. The first, a

Basic programming toolkit, is the one which will probably be most useful. Extra commands provided include automatic line numbering, colour setting for border, background and text, *Deek* (double byte peek), block line delete, variable dump, text string find, disc catalog printout, hex-dec convert, function key commands, Basic merge, pause, list print, trace, and so on.

get it to work with either the audio or RF output of the 64. Minus one point.

The third major feature is the monitor, *Powermon*, which can be called from Basic, by pressing a function key, or from the reset menu (of which more later). *Powermon* occupies its own special memory space in the cartridge, so it will not interfere with any resident program. It also allows you to use

centronics printers connected to the user port.

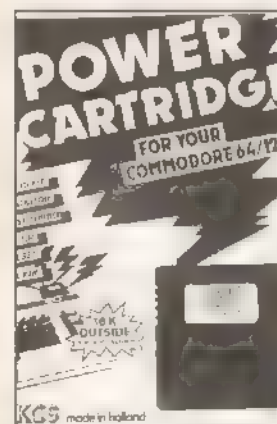
"On price, the power cartridge is a fair deal"

"The power cartridge includes fast disc loading - an increase of five to eight times"

The last feature is the reset page. Pressing the reset button on the cartridge brings up a menu from which you can select one of a number of options. *Continue* simply returns you to where you left off; *Basic* returns you to Basic, retaining all variables; *Reset* returns you to the standard start display and clears the memory; *Hardcopy* produces print-outs and *Monitor* speaks for itself. Overall, the *Power Cartridge* is most closely comparable to H&P's *Final Cartridge*.

On price alone the *Power Cartridge* is a fair deal, but in terms of general specifications it offers little which has not been available before.

Chris Jenkins



The power package

In all cases the command syntax is straightforward. The next major area of use is disc handling. The *Power Cartridge* includes fast disc loading, claiming a speed increase of five to eight times with normal programs, directory display without disturbing the program in memory, and routines to initialise, change device number, disc format, change file names, reset the disc drive and validate discs without all the normal cumbersome Commodore DOS commands. There are also fast load, save, verify, merge and audio commands. This last is supposed to put the signal from the cassette out to the TV speaker, but I could not

Ram from under the Basic and kernel Rom, which is not usually accessible. *Powermon* includes a full set of commands to assemble, disassemble, fill, hunt, jump, print, display registers, transfer memory areas and so on.

The next area of use is the printer command section, which allows you to make hard copies of the screen (with a suitable printer operating in graphics mode) in large, small, reverse, or normal print. Note that this function will not print sprites, but then neither will any of the other comparable cartridges on the market. The *Power Cartridge* also includes various commands for using

Product	The Power Cartridge	Micro Commodore 64
Price	£39.95	Supplier
Magnum Products, Highlands, Spencer Wood, Reading, Berks RG7 1AH. 0734 883193.		

Evesham Micros

PRINTER OFFERS

Check out these offers on top quality dot matrix printers. All the models offered are substantially reduced from the normal high street prices. Prices are fully inclusive of VAT, delivery and lead to suit any computer with centronics parallel printer port, eg. Amstrad, B.B.C., Einstein, Atari ST, Oric, Oregon, Manitech or MSX. For the IBM 64/128 we supply a user port centronics cable. For Spectrum or QL owners an appropriate interface is supplied for an extra £20.00, for Atari models other than the ST or a suit £30.00. Delivery is by insured recorded delivery and orders are despatched the next working day after receipt, provided we have stock.

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SPECTRUM	Amiga	Amstrad	Atari	Commodore	IBM	MSX	OS/2
Amiga 1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Amiga 2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Amiga 3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Amiga 4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Amiga 5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Amiga 6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Amiga 7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Amiga 8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Amiga 9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Amiga 10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Amiga 11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Amiga 12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Amiga 13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Amiga 14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Amiga 15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Amiga 16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Amiga 17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Amiga 18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Amiga 19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
Amiga 20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Amiga 21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Amiga 22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Amiga 23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Amiga 24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Amiga 25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Amiga 26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
Amiga 27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0
Amiga 28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
Amiga 29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
Amiga 30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Amiga 31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0
Amiga 32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
Amiga 33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
Amiga 34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0
Amiga 35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Amiga 36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0
Amiga 37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0
Amiga 38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0
Amiga 39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Amiga 40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Amiga 41.0	41.0	41.0	41.0	41.0	41.0	41.0	41.0
Amiga 42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0
Amiga 43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
Amiga 44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0
Amiga 45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Amiga 46.0	46.0	46.0	46.0	46.0	46.0	46.0	46.0
Amiga 47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0
Amiga 48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0
Amiga 49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0
Amiga 50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Amiga 51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0
Amiga 52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0
Amiga 53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0
Amiga 54.0	54.0	54.0	54.0	54.0	54.0	54.0	54.0
Amiga 55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0
Amiga 56.0	56.0	56.0	56.0	56.0	56.0	56.0	56.0
Amiga 57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0
Amiga 58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0
Amiga 59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0
Amiga 60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Amiga 61.0	61.0	61.0	61.0	61.0	61.0	61.0	61.0
Amiga 62.0	62.0	62.0	62.0	62.0	62.0	62.0	62.0
Amiga 63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0
Amiga 64.0	64.0	64.0	64.0	64.0	64.0	64.0	64.0
Amiga 65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Amiga 66.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0
Amiga 67.0	67.0	67.0	67.0	67.0	67.0	67.0	67.0
Amiga 68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0
Amiga 69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0
Amiga 70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Amiga 71.0	71.0	71.0	71.0	71.0	71.0	71.0	71.0
Amiga 72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0
Amiga 73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0
Amiga 74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0
Amiga 75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0
Amiga 76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0
Amiga 77.0	77.0	77.0	77.0	77.0	77.0	77.0	77.0
Amiga 78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0
Amiga 79.0	79.0	79.0	79.0	79.0	79.0	79.0	79.0
Amiga 80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
Amiga 81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0
Amiga 82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
Amiga 83.0	83.0	83.0	83.0	83.0	83.0	83.0	83.0
Amiga 84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0
Amiga 85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0
Amiga 86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0
Amiga 87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0
Amiga 88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0
Amiga 89.0	89.0	89.0	89.0	89.0	89.0	89.0	89.0
Amiga 90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
Amiga 91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0
Amiga 92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0
Amiga 93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0
Amiga 94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0
Amiga 95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
Amiga 96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0
Amiga 97.0	97.0	97.0	97.0	97.0	97.0	97.0	97.0
Amiga 98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0
Amiga 99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0
Amiga 100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Duke has More than one Just Version (See Price Section)									
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Amiga 2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Amiga 3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Amiga 4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Amiga 5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Amiga 6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Amiga 7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Amiga 8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Amiga 9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Amiga 10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Amiga 11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Amiga 12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Amiga 13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Amiga 14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Amiga 15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Amiga 16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Amiga 17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Amiga 18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Amiga 19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
Amiga 20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Amiga 21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Amiga 22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Amiga 23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Amiga 24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Amiga 25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Amiga 26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
Amiga 27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0
Amiga 28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
Amiga 29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
Amiga 30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Amiga 31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0
Amiga 32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
Amiga 33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
Amiga 34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0
Amiga 35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Amiga 36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0
Amiga 37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0
Amiga 38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0
Amiga 39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Amiga 40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Amiga 41.0	41.0	41.0	41.0	41.0	41.0	41.0	41.0	41.0	41.0
Amiga 42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0
Amiga 43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
Amiga 44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0
Amiga 45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Amiga 46.0	46.0	46.0	46.0	46.0	46.0	46.0	46.0	46.0	46.0
Amiga 47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0
Amiga 48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0
Amiga 49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0
Amiga 50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Amiga 51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0
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Amiga 70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Amiga 71.0	71.0	71.0	71.0	71.0	71.0	71.0	71.0	71.0	71.0
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Amiga 89.0	89.0	89.0	89.0	89.0	89.0	89.0	89.0	89.0	89.0
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Amiga 94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0
Amiga 95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
Amiga 96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0
Amiga 97.0	97.0	97.0	97.0	97.0	97.0	97.0	97.0	97.0	97.0
Amiga 98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0
Amiga 99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0
Amiga 100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The imaginative Image System

Christina Erskine draws out the newest art package



Graphics and art packages are storming into the Popular office at the moment – the latest being CRL's *Image System* for the Amstrad CPC machines.

Art programs are fast becoming standardised. No longer is it enough to give the facility to draw lines, fill them in

"All 28 colours on the Amstrad can be used, 16 at any time"

various colours, and dump the result to a printer, but circle routines, rotation, zoom, texture variety, airbrushes, and the ability for the program to operate with joysticks, mice, light pens etc. are all considered hallmarks of the quality art program.

The *Image System* has some, but not all of these. Firstly, it operates solely from the keyboard. There are worse keyboards to use with a graphics package than the Amstrad's, but it is still unwieldy.

For example, to draw your line, you use the cursor keys plus *Shift*. A variety of keyboard controls then enable you to draw circles, change colour, the colour palette options, textures and so on.

All 28 colours on the Amstrad can be used, 16 at any one time. The first 16 colours are set out at the bottom of the drawing screen, and accessed – this gets tricky – sometimes by numbers 1-8 or *Shift* 1-8, and sometimes by the cursor keys, according to what mode you are in.

The extra 12 colours can be accessed separately using their code numbers (consult either instruction booklet or Amstrad manual, or the top of your 6128 disc drive). If you want to colour anything brown or pink (flesh tones, for example), you'll need to go through this rather cumbersome process fairly soon, since the 'base' colour screen is heavily weighted in favour of green, yellow and blue.

The main drawing aids in the program

are circles, fills and straight lines from point to point.

A circle is created by defining the ex-

"The basic free-hand drawing mode is fairly simple to use"

treme points of its diameter, a line – most useful for diagonals – by setting its extremities, and fills by cursor positioning and *Shift/Copy*. The fills are pleasingly quick, while the circles are at their best when large. Small circles look disconcertingly squashed.

The basic freehand drawing mode is



Above and below: examples of the creative heights reached with *The Image System*

fairly simple to use, but inevitably slow and finicky, and thus difficult to use well.

If your line overshoots, or goes off-course, then to delete a small part, you must change your drawing colour to that of the background, and go over the exact lines of the mistake. It must now be apparent that this is not a program for the uncoordinated.

Indeed, in the accompanying booklet, CRL suggests that if you have a definite picture in mind, try it out freehand first with felt pen and acetate film which you can then position over the screen and 'trace' with the *Image System*. To me, this rather negates the idea of computer art packages making drawing easier for the hopelessly inartistic.

Having created a picture, it can be saved and modified. It can be rotated, moved around the screen, and scaled up or down in size. The finished image can of course be dumped to a printer.

As an arts package, the *Image System* is far less sophisticated than many on the market, and on the Amstrad hits some very stiff competition from the recently converted *Melbourne Draw*. However, it has most of the facilities expected of programs of this type, its main drawback being the limitations of using the keyboard only

Program *The Image System* **Micro**
Amstrad CPC 484, 864, 6128 **Price**
£19.95 cassette, £24.95 disc **Supplier**
CRL, 9 Kings Yard, Carpenters Road,
London E15.



Fame and fortune – or too much work?

David C Ridge charts some of the main concerns involved in setting up and running a software house in the first of a two-part series

I should first of all point out that my own company, Novelsoft, is not what one would label a "successful" company by most definitions of the word, due mainly (I hope) to the very short time we've been in existence (less than one year). However, as head of marketing and administration, I have learned a great deal about what **■** do, what not to do, and why.

I don't claim to know the usual motivations for starting a software house but someone once said, "When frustration overcomes fear, a person will take action." This was certainly the case where we were concerned. Our reasoning was unoriginal but sound – we didn't mind working hard but why should we make someone else rich doing it?

The chain of events which fed **■** this line of reasoning was equally unoriginal. In fact they read like a bad Hollywood script: Scene 1 – Programmer writes program. Scene 2 – Programmer signs contract with company which promises the world. Scene 3 – Programmer and company begin to develop a unique rapport:

Programmer: "When are you guys going to do some advertising? ... And what about some decent packaging? ... And when am I going to see a royalty cheque? ... And when are you going to send the review copies out?"

Company: "Next month ... next month ... next month ... next month ..."

Scene 4 – Several repeats of scene 3.

Too much work

You may have been able to handle things on your own when all you were doing was writing the software but you will find it impossible to carry out the administrative duties too. There are manuals to write and reproduce, packaging to design, advertising copy to get out, programs to duplicate, review copies to mail, orders to fill, not to mention customer support. Try doing all this alone and you'll end up in a nice room with QL keyboards on the walls.

We are a very small firm with one full-time programmer, one full-time person **■** handle marketing and administration, and a few talented volunteers and we still find the amount of work staggering! So, unless you've got the necessary start-up capital to hire a small staff (and that's not usually the case), then a partner or two is essential.

There are a host of good reasons for having partners, the most obvious being the extra start-up capital they usually bring with them. But equally, if not more important, is the diversity of talent and ideas. And don't underestimate the value of moral support! Starting a new business is a scary endeavour, full of ups and downs

(sometimes more downs than ups). Without someone else around to remind you what you're here for, it would be far too easy to pack it all in when things aren't going well.

Dealing with licences

Even though you have your own company you still may find that you must strike a deal with another company or distributor from time to time. To break into markets in countries other than your own, you will probably have to deal with an established distributor in that country. Many smaller companies are now signing deals with larger houses to market and use their distribution channels more effectively for new titles.

I will use the Spectrum market as an



Jeff Minter - now doing licensing deals with third party companies

example since it is likely **■** have the broadest audience of potential entrepreneurs. Based on my own experience, research and observations, I have come up with the following figures: a top game is expected **■** sell 30,000 to 50,000 copies, a top utility or business program about 5,000-7,000 copies, and a new language implementation about 1,500-2,000 copies. These figures are for the UK market alone.

A 15% royalty **■** the retail price is an average arrangement with most third party licensors. A typical deal for a good utility program might be something like this: a 15% royalty on retail sales with a guarantee of £3,000-£4,000 over a period of six to 12 months and an up front payment of £1,000-£2,000 against future royalties.

Deciding what sort of software to write for your expectant public is a fairly critical step. The conclusion is not as obvious as the sales figures would seem to indicate. The major consideration is, which market are you planning to write for, rather than which category?

The level of sophistication of today's crop of computer games is extremely high. To compete on this level requires a tremendous commitment of time. Add to this the fact that the games market is the most

fickle with the shortest market life and you begin to see why you may want to think twice about getting involved with this category.

Even though the projected sales of business programs are many times smaller than those of games, business programs are often the easiest to write from the point of view of programming knowledge and originality of concept. They also have a much longer market life.

The redeeming factor in the languages category is that although these products sell in relatively low quantities, they almost always command the highest price – typically two to three times that of the average game. And these products have the longest market life.

Financial reward aside, what you choose to write will usually be determined by the type of products and machines that you, your partners or your programmers already have experience with.

I have studied how software houses become successful (a rare occurrence indeed) and how programmers get rich (an even more rare occurrence) and have come to this conclusion: contrary to popular belief, a programmer does not get rich by writing lots of programs. In almost every case I studied, the recipe was the same – write one excellent, state-of-the-art program, refine it over a period of time, and rewrite it for many different machines (Kevin Toms with *Football Manager*, and Matthew Smith with *Manic Miner/Jet Set Willy*, being obvious examples).

You see, what most amateur programmers don't really understand is that over half the work involved in creating a new program is in designing the specifications, i.e. what it will do, how it will look, how it will work, how it will 'feel' to the user, how the different parts interact and interface with each other.

This part of the work remains essentially the same during the rewrite for other machines. When you elect to rewrite, you already have the idea perfected, the design groundwork laid, and the buying public will be familiar with the package through other machines. In some cases you can even use the same manual and advertisements. Starting from scratch would take two to three times longer.

I hear you saying to yourself, if that's all there is to it then why aren't all programmers rich? Because it's a rare programmer indeed who is a virtuoso of more than one or two different machines.

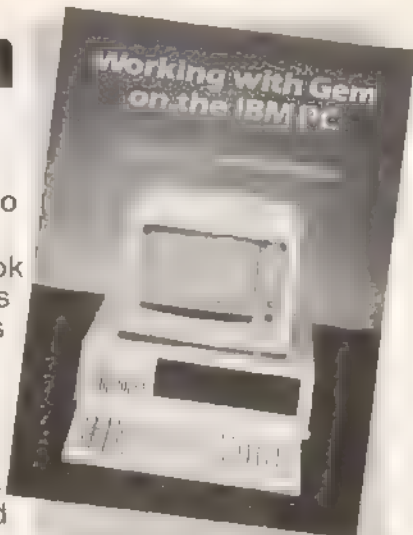
Next week: Marketing the product and choosing a machine.

David C Ridge is a senior partner with Novelsoft, a software company based in Toronto, Canada.

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Getting trapped by the Trap

Trap is the latest offering from the mighty assembler of Tony Crowther, now back on for after a recent thin patch.

He says he can't stop playing Trap, but he can ■ forgive this immodesty. Addictive it is.

It's a shoot 'em up of the old school, enhanced by some tasty 3D graphics, and the action ■ fast and certainly furious.

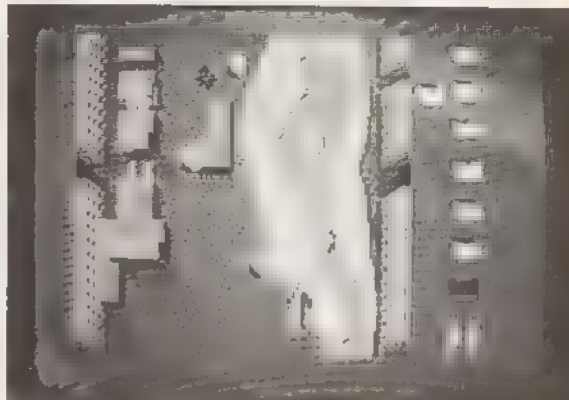
You begin on final approach to a planet, avoiding and shooting space mines. On arrival the locals come out to greet you with lasers, bombs, missiles and sundry other forms of destruction ■ which you must respond in kind.

You then enter a valley where you must bomb a certain number of ships in the river, knock out laser turrets, blind the spying eyes or face a fleet of security ships, and pick up cargo and fuel. Dropping cargo to the waving refugees will gain you extra lives.

At the head of the valley you leave the ship and set out on foot, knocking out various robots on the way, to collect an orb. These orbs are crucial as they allow you to upgrade your space ship for more powerful models.

If you succeed, it's back to the start for another run - against more, faster, more difficult adversaries.

It sounds like the same old



story and it is. But it's well done with superb sound and music, great graphics, and well-constructed gameplay. If we can't have originality, let's have fast and addictive action. Tony Crowther delivers.

Incidentally, at first I thought Trap was insanely difficult and almost gave up. But stick with it

- it can be done and the rewards make it worth persevering.

Peter Worlock

Program Trap Micro Commodore 64/128 Price £9.95 (tape & disc) Supplier Alligata Software, 1 Orange Street, Sheffield S1 4DW.

Cloak of death offers spooky fun

You've done it now haven't you, you really have. That door closing shut behind you was the stark reality that you really should have kept your big mouth shut, instead of idly boasting in the pub that staying the night in the old house (which has been deserted for 30 years) was easyville.

The bet was as good as won before you even set foot inside

you thought. Well, you thought. Well, you thought wrong, very wrong, because there's evil afoot in that old spooky house and now you're going to have to just get on with the job of saving your skin instead of jumping out of it!

David Cockram has constructed a mean adventure here, with plenty of puzzles to keep any seasoned adventurer

well satisfied. I would say he's 'borrowed' his style from the Scott Adams series, and this is in evidence right from the start. Whilst exploring the study, you come across a desk which in the original description is bare, but, upon examining it you see the words "I've found something". And lo and behold I've found a letter. Combine this with verb/noun vocabulary and there you

have it - a Scott clone.

A tasty story though, and one which has its fair share of very lateral problems. I liked it a lot.

Popular Appeal ♦♦♦♦

Andy Moss

Program Cloak of Death Micro Atari XE/XL Price £2.99 Supplier Supplier Bug Byte, Victory house, Leicester Place, London WC2.

Nocturne is awkward but interesting

Quill'd adventures have become commonplace at the budget end of the market. It looks as though we

might be in for a flood of GAC'd games too.

The second to reach our office was Nocturne (following

The Beerhunter), in the Alpha-Omega range, running on the Amstrad 464 and 664. Incidentally, there's no credit given to Incentive's GAC.

Getting started was a little difficult, since the documentation is unhelpful, to say the least. You awake on board an alien spaceship having been kidnapped by extra-terrestrial zookeepers. Your task is to get back to earth.

The first location is a featureless cell containing you and a locked door. How to open the door? Well, obviously, you BASH WALL. No, the combined brains of Popular couldn't solve that one. We had to phone Alpha for help.

You'll waste a lot of time trying to guess the program's

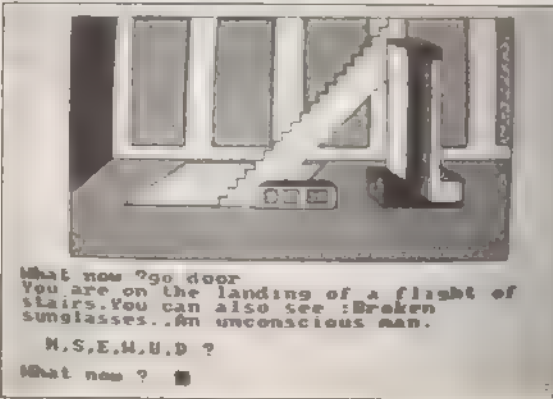
unusual vocabulary but there are more reasonable puzzles to be solved. What, if anything, can be done with the bodies in suspended animation? Will the gorilla prove at all helpful?

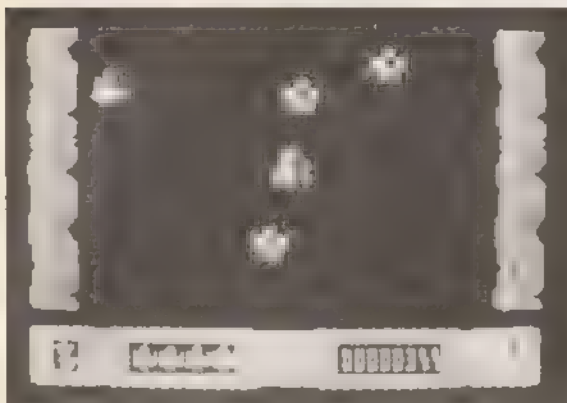
On balance, Nocturne is a reasonable adventure but with some idiosyncracies that mar the game. It's nowhere near the standard of Infocom or Lev- ■ 9, and even at £4.95 is a little overpriced - £2.99 is nearer the mark.

Popular Appeal ♦♦♦

Peter Worlock

Program Nocturne Micro Amstrad CPC 464/664 Price £4.95 Supplier Alpha-Omega Software, 9 Kings Yard, Carpenters Road, London E15.





It's silly name time again with the release of *I.C.U.P.S.* from Thor Computer Software Ltd. This stands for the rather pompous sounding agency, the International Commission for Universal Problem Solving, of which you would be a prospective agent.

In order to join this high and mighty organisation you must successfully complete a computer simulation that tests your abilities to the limit. At least

that's what it's supposed to do.

The game, then, consists of flying up a screen devoid of scenery save for a thin strip of meaningless squiggles down either side, blasting away at ordinary looking alien ships. It's not all plain sailing though, thanks to the torpedo (at least that's what they looked like) laying aliens which must be avoided unless you fancy rejection and life on the galactic dole queue.

A few hiccups found in I.C.U.P.S

Your ship banks from side to side, *Uridium* style, as you swerve around said torpedoes, something not very easy at top speed. The answer to that is to slow down from behind. Oh well, you can't everything, although Thor have certainly tried because *I.C.U.P.S.* also features the sort of manoeuvring most recently found in *Spy Hunter* where you bludgeon other cars off the road.

Having completed scene one, by progressing far enough up the screen, you start scene two which is just the same except for a different coloured border. Exciting stuff what?

Once scene three is finished you move onto part two of the test where you turn from a spaceship into some sort of

mutant cockroach.

As the jolly looking cockroach you zap, *Jet Pac* style other mutants and go searching for the four parts of a bomb secreted within the confines of the starship in which you have found yourself.

It's hardly gripping stuff but I expect insomniacs everywhere will love it. Not so much a game, more bits of several other shoot 'em up's cobbled together and unfortunately overpriced.

Popular Appeal ♦ ♦

Duncan Evans

Program *I.C.U.P.S.* Micro C64 **Price** £8.95 **Supplier** Thor Computer Software Ltd, 74 New Oxford Street, London W1

Project Nova: Star Trek revisited (again)

One of the earliest forms of home computer game, *Star Trek*, crops up again and again in various forms. This is the first decent version I've seen for the C16, and I must say it was a great deal better than I thought it could possibly be.

The game isn't as complex as it likes to make out, though. There are two basic screens: a view from your battlecruiser, including a brilliantly animated starscape and various controls

for energy level, ammunition, damage, speed and so on plus the computer control screen, where you select the star quadrant you wish to warp to before engaging your hyperspace drive.

Once you have moved into a sector inhabited by alien ships, it's all action as you track them down with your radar scanner, zap them out of the cosmos and struggle to repair your damaged systems in time after

each encounter.

On the first level it's pretty easy to reach the level "Legendary", just stick the shields on full power, and leap from quadrant to quadrant blasting the fast-moving aliens, repairing your damage then leaping again. I completed this level in about ten minutes. Fortunately, there are nine levels to complete, and the later ones are faster, harder and much more challenging.

Project Nova has few origi-

nal ideas, owing a great deal to *Codenamed MAT* and others, but is an excellent implementation for the C16 and well worth seeking out.

Popular Appeal ♦ ♦ ♦ ♦

Chris Jenkins

Program *Project Nova* Micro C16 **Price** £7.95 **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Shetfield.

Shape Schools Lessons: missing the human touch

Educational software claiming to be for three to six year olds fills me with trepidation; that age a determined child can do enough damage to a heavy board picture book, let alone a rubber keyed Spectrum.

Peter Grove of Jodan Software is of a similar opinion, going on the notes accompanying his first two releases. They stress that a joystick would be a better method of control than

keys whenever possible, but more importantly a parent should always be to hand to discuss the lessons.

Tape one is concerned with colour and shape recognition while two is about numbers, including addition and subtraction. Each contains exercises on the first side with a game, which allows for different difficulty levels, on the reverse.

In a recent interview with Pat Bilton of Mirrorsoft, she

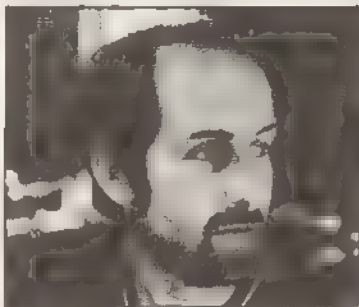
stressed the importance of entertainment and reward in educational software. In this respect the programs are very successful. Taking a lesson from Mirrorsoft's *Mister Men*, Grove has created an amusing geometrical cast whose little dance and waves even brought a smile to my cynical lips.

I can imagine a child enjoying the antics of the nicely animated figures and getting to enjoy the games, providing a

parent had explained what to do first - but then again, the chip can never replace the human touch.

John Minson

Program *Shape School Lessons 1 & 2* Micro Spectrum 48K **Price** £3.99 each; £8.99 for both **Supplier** Jodan's Software, 68 Dingleberry, Olney, Bucks MK46 5ET.



Problems solved in *Magick* and *The Pawn*

Tony Bridge comes to the rescue of readers in distress

Andie Nixon has been in contact recently, asking for help ■ Talent's adventure, *Zkul* and Sinclair/Magick's *Scrolls* QL version of *The Pawn*. I particularly liked *Zkul* when ■ first appeared: it was the first (I think) adventure ■ appear on the QL, and it was a very traditional story of caves, trolls and treasure, and devious puzzles. Andie writes, "Dear Tony, what are the tongs for, when and where do I blow the horn, what is the booby-trap for and how do I reach the Medusa? Oh, and what is the 'Cossat' for?" If you have lots of back issues, Andy, then look at Volume 4, Number 17, where you'll find some help for early problems, including the dwarves and the rope – and Vol 4 No 21 for help on the 'cossat' problem (and if you don't have these issues, then *Popular's* subscription department will gladly send them on to you).

Unfortunately, there's not a ■ I can help you with here (the dreaded *Bad Medium* struck again!). In a narrow passage not far from the deep pit, you'll find a mirror, and this should give you an idea of how to deal with the Medusa.

Cossat is one of those lovely words that crop up in adventures from time ■ time (and there's another one in *Zkul* – 'Toobee' experiment by typing ■ the word, or reverse it).

In fact, you'll need to do both here – type *Tassoc* to escape from the room. Once you have the cossat, you can leave it at a location, and by typing *Cossat*, you will be instantly transported to that location from wherever you are. Toobee can be used in a similar way, but this time you will be transported to the hut where you can drop your accumulated treasure – *Toobee* again takes you back to the room under the cave, ready for more.

The Pawn has been very well received in just about every quarter. True, the graphics and general operating environment of the Atari St version are extremely well-done; not only can the graphics be pulled down as required, but they can be pulled down, like a shutter, over as much of the screen as required. This facility, together with the use of the mouse in manipulating the program, is rather dazzling and naturally most reports have focused on this along with the merits of the much-vaunted parser.

There are ways round this of course; *Ramsave* is ■ faster version ■ *Save*, but

they accomplish the same thing – and the *Oops* command from Infocom, and more lately level 9, allows recall and thus re-editing of a previous command. But I feel happier banging away with the usual verb/noun combination, even though it may take several inputs to achieve what one command can with a more complex parser.

Now ■ *The Pawn*: the first thing that happens in the story is that Kronos gives you a note – what to do with it? Well, after collecting the chest, you must make your way east to the garden, where you will pick up some tools from the shed. Now go to the guards who stand at the gateway to the palace and give them the note. Eventually, an adventurer will turn up riding on a horse with no legs – give him the chest and what happens!

A little later, you'll come across an immovable boulder (aren't they always?), and it is now that the hoe, the rake and your shirt come in handy. Simply tie the rake and the hoe together with the shirt and *vola!*, a lever for the boulder. This will allow you to get snow to fill the guru's bowl upon which colours appear in the forest. If you mix the three colours, you'll get ■ nice white light which comes in handy elsewhere.

Go back to the climbable tree, and open the door (you'll have found the wooden key in the shed); now close the door and move the planks, whereupon a way down becomes apparent. North of the white room, you'll find the office, and it is here that you must search for a well-hidden safe, containing some important papers. Further west ■ the lounge: here you'll find a coin cunningly concealed, as well as a hard hat which must, of course, be worn at the appropriate moment. The lift, northwards from the lounge, is worth exploring and one of the tools from the humble garden shed comes in handy at this point.

As in so many adventures, there is an incarcerated princess waiting to be rescued. The key to achieving this will be found by stopping the lava flow in the caverns – simply break or push the wall in the riverside chamber. The rest should be fairly straightforward.

From a traditional text adventure to a not-so-traditional graphic adventure, Gargoyle's *Heavy* on the *Magick*. Barbara Winterton is a teacher and together with ■ group of her pupils has solved many games – but their favourites are the Gar-

goyle adventures, *Magick* ■ particular.

Some time ago (in vol 5, no 23), Andrew Hay gave us some hints for *Magick* and declared himself stuck at what he thought was the final exit. Barbara informs me, quite rightly, that it is in fact the *second* exit (on level two, in the eye of Heaven). This ■ the door with the clue "An eye for an eye to enter Paradise", and Barbara hints that the answer lies in a bit of resurrection. She and her pupils are willing to give first-hand advice on *Magick*, the other Gargoyles, and many other adventures.

Write ■ ■ Sandringham Road, Wetherby, West Yorkshire LS22 4PG (enclosing an SAE if you would like a reply), or call her on 0937 65841.

Brian Cheadle and his friend Paul Atkinson were kind enough to send me large maps of the dungeon in *Heavy* on the *Magick*, along with several pages of information about using objects, battling monsters, passwords and son on – thanks for the invaluable information. Brian and Paul might wish to pass along some of this to you, though possibly in a condensed form. Write (with the usual SAE) to 91, Cavendish Road, Hazel Grove, Stockport.

Darren Stanley of Worthing is one Axi who might benefit from some help, although he has divulged some very interesting (and hard-won, I'm sure) facts about the game.

But he still has several unresolved problems: the sign to the west of the first location, Darren, is a form of a well-known ancient coding device. In *Quadra Porta* (on level two) is a door with a clue; "The Great Sign I in Free" – I'll leave you to connect the two and decide what to do!

The star signs in the key rooms aren't there by coincidence, as you might imagine, cast your mind back to Gargoyle's other games and the word-play that the authors indulge in. You won't be surprised to hear that there are similar puns here too.

As an example, the nickel key beneath the Leo sign in the Gothic complex will open a door ■ the deepest part of the dungeon – in the room of pride (lion = pride!). Although some ■ the connections are a little obscure, most are fairly obvious.

The disc version for the Amstrad makes for a very much more enjoyable game in my opinion, as having Axi's and games is speedy and very convenient.

Beginners' guide to using game pokes

Tony Kendle offers some guidance for novices trying to enter game pokes



Following on from the ever popular but seemingly interminable Wally Week games, MikroGen has a new series featuring one Ricky Steel – psychopathic teenager of the 21st century. The publicity blurb conjures up a less endearing character than Wally was, and even he failed to be the multimedia star of game book and record that Mikro-Gen once hoped. However the Steel series does offer one important advance over the Wally games in that we have been given a promise that every new release will be innovative and different in style rather than sticking to an fairly rigid format.

The first Steel game was actually announced at the same time as the excellent *Equinox* and for the same machines, Spectrum and Amstrad, but was later in appearing. The more I play *Equinox* the better I think it is – one of those rare, successful blends of strategy, skill and furious blasting. *Stainless Steel* isn't quite as good but it has some exceptional graphics. Smooth scrolling on the Spectrum has been redefined since *Elite* brought out *Commando* but it is still rare on the Amstrads because of the relatively large amount of screen RAM to access and *Stainless Steel* is very good indeed.

Most of the game consists of flying an air car, seen top down, over a fast moving landscape. The objective is to shoot some things, collect other things and overall have a blasting good time. All of Mikro-Gen's games are expensive but they are often worth hours of playing and the company can match Gremlin Graphics and Gargoyle for ensuring that the quality of conversions is up to scratch.

Sigue Sique Sputnik is becoming more renowned for their publicity stunts lately than for their music and since some of their escapades show signs of high spirits and an unhealthy fascination with the racy side of life I was in two minds when I received an unsolicited Commodore 64 disc through the post. This featured nothing more than pictures of the group but we should probably take it as a warning that there is an accompanying game under development somewhere. We can only hope that it is in the hands of someone capable such as Denton Designs who did such a creditable job with *Frankie Goes To Hollywood*.

The tips for this week come from Mark Gidley who has sent in some pokes for the

BBC which he discovered. These are:
i) for Melbourne House's *Gyroscope*,

2&1951 = x where x = lives

Call & D00 to start the game.
ii) or *Battin I & II* from Addictive Games,

2&1014 = x where x = the screen you want to start at

Call & 1010 to start the game
iii) For Software Project's *Ledgeman*;

2&2977 = lives

2&297A = start screen

Call & E00 to start the game
iv) For US Gold's *Bounty Bob Strikes Back*,

2&E0F = lives

2&E0B = start screen

Call & E00 to start the game
v) For US Gold's *Bruce Lee*;
Type in the following:

*L BRUCE 1900

2&130F = lives

Change the tape or disc here if required

*S BRUCE1 1900 + 3490 4060

This produces a new and modified version of one part of the game program. To load the new game rewind the tape or boot the disc (depending on which format you have *Bruce Lee* on) and run the program from the start. However once you have reached the part where you have defined the keys remove the original and insert the version you have made.

I am of course very grateful to Mark for his tips, but I know already that some beginners will have problems in using them because not enough information has been given on how to get the pokes in. Can I repeat a plea made earlier that contributors make as much effort as they can to ensure that all the required steps are included as clearly as possible.

In this particular case it is not critical because Mark writes that he would like a pen-pal and would welcome letters from readers of the column who are interested in writing. Contact him at 296 Newton Road, Rushden, Northamptonshire, NN10 0SY and I am sure he will be willing to help with any problems.

As a follow-on to this comment I have decided to begin an occasional course on teaching beginners how to use pokes. Experienced readers will have to bear with this but we really do have a lot of letters from people who find the whole thing confusing, and I promise that it won't take up much room in any one week.

To begin with we will consider some jargon. Mark's tips above usually consisted of just two pieces of information – a poke (called a fancy name by Acorn and signified by a ? = command) and a Call address. What do both of these mean?

For speed and compactness most computer games are written in machine code rather than Basic or any other high level language. Machine code doesn't make much sense to ordinary people since it just looks like a series of numbers, but these numbers represent commands to the central processor of the computer and as a program is run each of these commands is read and acted on in turn.

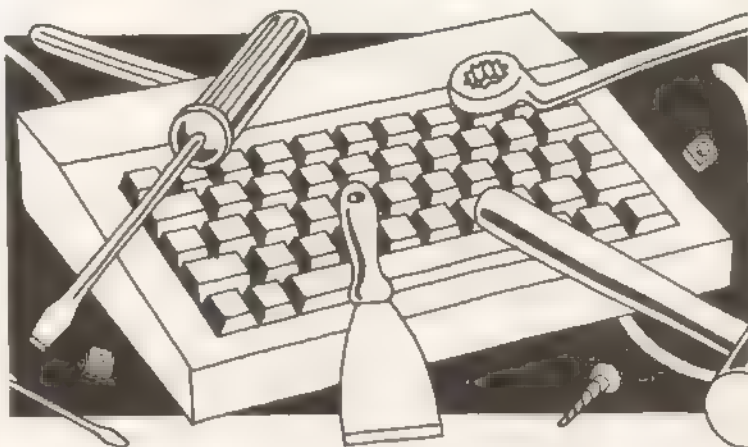
Some instructions are actually made up of two or three numbers together and sometimes the numbers actually do represent just numbers – the computer understands what you are trying to get it to do as much by the order in which the numbers are encountered as by which numbers they are.

A machine code program is stored in a series of memory locations each referred to by means of an address number – in a 64K computer the numbering would progress from 0 to over 64000 (although some of these addresses may be reserved for the computer's own use). To run a machine code program you just tell the computer the correct address to begin or the sequence of numbers will be misinterpreted and the game will crash. For many hackers this is the hardest piece of information to find. Some programmers will begin the game with some dummy instructions or numbers that are never meant to be acted on just to obscure the true starting place. To start the program on most computers involves typing Call address.

Typically one of the memory addresses in the program will be holding a number that refers to the number of lives that the player has. If we can find this address it is a simple matter to poke a different number in place to give us more lives before we make the starting Call.

Smart Display on the QL

The procedure also checks for the escape key and *Exits* from the procedure if this is detected. The variable *Cancel* is switched positive if *Esc* is used, enabling your program to detect this.

[illegible]

Double your characters on Spectrum

Type the program in and run it. Then

1 Clear 64702
2 Load "reduce" 64703
Adding these lines ensures that Ramtop

Please note that the first eight bytes of the UDG file are used so that the graphic "A" cannot be used in your program.

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10 REM The Editor Routine
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1900 REM *****
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1980 REM *****
1990 REM *****

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2000 REM *****
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2780 REM *****
2790 REM *****
2800 REM *****
2810 REM *****
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2970 REM *****
2980 REM *****
2990 REM *****

```

Programming: C64

Recovering lost files on the C64

by Duncan Anderson

If you are anything like me, and use a disc drive for programming, you will inevitably have suffered the ultimate "disaster", whereby you accidentally scratch your latest, most important file. If you are new to the complexities of disc filing systems, you would probably give up in despair, and consider the file lost forever. If you are experienced in such matters, you would hurriedly search for a disc monitor, and wade through the directory track, and somehow recover it. However, neither method is particularly satisfactory; one is a waste of time, the other is complex. So, here is a program which painlessly recovers any lost files.

Although the program was written for the 64, it works with a Commodore 128 in both 64 and 128 modes. Furthermore, it can be easily adapted for other Commodore computers (Plus/4, C16, and Vic-20) by changing the colour pokes in line 50, and the bell subroutine at lines 8000 to 8070.

The following program achieves its aim, by listing all the deleted entries in the directory. N.B. this is not a complete directory - only a list of deleted files, not all of which may be recoverable. As it does so, it takes the user if he wants the file recovered, if so, a list of file types is displayed. To select the required type (11 probably either PRG=program, or SEQ=sequential file), move the cursor onto it with the aid of the cursor keys, and

then select by pressing *Return*. That is all that is required, no pulling out of hair, and no sleepless nights - just a short Basic program is all that is required to rescue your masterpiece!

As you will probably have realised, when a scratch command to the Disc Operating System, it does not erase the program from the disc, but merely marks it as deleted in the directory, and releases

the disc space for future use. Provided that no subsequent writing to the disc has been performed since the deletion, it is a relatively simple matter to recover the file. To do this, you need to search the directory for the entry (this is the complex part using a disc monitor), and then reset the file type to its original value. The disc is then initialised, in order to update the Block Availability Map.

```

10 rem *****
20 rem *****
30 rem *****
40 rem *****
50 Print "*****";Chr$(14);Chr$(8);Poke 53280,0:Poke 53281,0
60 Print Spc(10);"DISC FILE RECOVERY"
70 Print Spc(10);"*****"
80 Print
90 Print "Use this program to recover deleted "
100 Print Spc(10);"files from your discs."
110 Print:Print
120 Print "Insert disc into drive."
130 Print "Then Press [RETURN]:"
140 Input AS
145 Open 15,8,15:Open 2,8,2;"#"
150 Print:Print
5000 rem *** list files in directory ***
5010 t=18:s=1
5020 rem repeat
5030 : Print#15,"u1 2 0":t=t+1
5035 : ot=t:ns=s
5040 : Get#2,t,s$
5041 : if t$<>" " then t=asc(t$)
5042 : if t$="" then t=0

```


Programming: C64

```

5043 : if s$<>" then s=asc(s$)
5044 : if s$="" then s=0
5050 : for n=0 to 7
5060 :   get#2,ft$:if ft$<>" then ft=asc(ft$)
5065 :   if ft$="" then ft=0
5070 :   get#2,a$,a$
5080 :   for x=3 to 18
5090 :     get#2,a$:f$=f$+a$
5100 :   next x
5110 :   if not((ft=0 or ft=128)and f$<>"")
then 5120
5111 :   Print:Print "3";f$;"4"; RECOVER F
ILE (Y/N) ?";
5112 :   get a$:if a$<>"y" and a$<>"n" then
goto 5112
5113 :   gosub 8000
5114 :   if a$="y" then gosub 6000
5120 :   f$=""
5130 :   for x=19 to 31
5140 :     get#2,a$
5150 :   next a
5160 :   next n
5170 : if not((t=0 and s=255) then 5020:rem until
t=0 and s=255
5175 : if a$="n" then goto 6000
5180 : Print:Print spc(8);"NO FURTHER FILES ON D
ISC"
5190 : Print:Print:Print spc(11);"TRY ANOTHER DI
SC ?"
5192 : print#15;"10"
5195 : close 2:close 15
5200 : get a$:if a$<>"y" and a$<>"n" then goto 5
200
5205 : gosub 8000
5210 : if a$="y" then goto 50
5220 : end
6000 : rem ***** recover file *****

```

```

6010 : Print"#####";
6100 : ba$= "#####";
6200 : Print " [SEQ] [PRG] [USR] [REL]";ba$;
6300 : x=2
6400 : get a$:if a$="" then 6400
6500 : if a$="H" and x<4 then x=x+1
6600 : if a$="I" and x>1 then x=x-1
6700 : if a$=chr$(13) then ft=(ft or x):gosub 80
00:goto 6800
6710 : if x=1 then Print "[SEQ] [PRG] [USR] [R
EL]";ba$;
6720 : if x=2 then Print "[SEQ] [PRG] [USR] [R
EL]";ba$;
6730 : if x=3 then Print "[SEQ] [PRG] [USR] [R
EL]";ba$;
6740 : if x=4 then Print "[SEQ] [PRG] [USR] [RE
L]";ba$;
6750 : goto 6400
6800 : Print#15;"b-p 2";(n*2)+(n*30)+2
6900 : Print#2,chr$(ft or 128);
7000 : Print#15;"02 2 0";ot:os
7100 : Print#15;"b-p 2";(n*2)+(n*30)+2+19
7200 : return
8000 : rem ***** bell *****
8002 : sid=54272
8005 : for l=sid to sid+24:Poke sid,0:next
8010 : Poke sid+1,10
8020 : Poke sid+5,9
8030 : Poke sid+15,30
8040 : Poke sid+24,15
8050 : Poke sid+4,20
8060 : for l=1 to 200:next:Poke sid+4,21
8070 : return

```

ready.

Programming: Amstrad

3D maze for Amstrad CPC

by J Kennedy

There now follows the remaining half of the 3D Maze listing for the Amstrad CPC computers. If you don't want to type it all in them the game can be obtained, on cassette and with a title screen, from J Kennedy, 32 Bayview Road, Bangor, County Down, N. Ireland BT19 2AR. Please send £2, but no cheques so use recorded delivery.

```

1650 : IF mazeX(x+1,y)=1 THEN INK 6:20 ELSE
E IF mazeX(x+1,y)=1 THEN INK 10:20
1660 : IF mazeX(x+1,y)=1 THEN INK 3:20:INP
3:20:INP 5:20:INP 7:20:INP 9:20:INP 11:
20:INP 13:20:RETURN
1670 : IF mazeX(x+1,y)=1 THEN INK 5:10 E
LSE IF mazeX(x+1,y)=1 THEN INK 9:10
1680 : IF mazeX(x+1,y)=1 THEN INK 7:10 E
LSE IF mazeX(x+1,y)=1 THEN INK 11:10
1690 : IF mazeX(x,y)=2 THEN INK 2:10 ELSE
E REM IF mazeX(x,y)=1 THEN INK 0:20
1700 : RETURN
1750 : REM key press
1760 : flag=1
1770 : IF INKEY="" THEN 1770
1780 : IF (INKEY) AND 1 OR INKEY(1) OR 10
AND 10 AND mazeX(x,y)=1 THEN y=y+1:flag=1
1790 : IF (INKEY) AND 1 OR INKEY(1) OR 10
AND 10 AND mazeX(x,y)=0 THEN y=y+1:flag=1
1800 : IF (INKEY) AND 1 OR INKEY(1) OR 10
AND 10 AND mazeX(x,y)=0 THEN y=y+1:flag=1
1810 : IF (INKEY) AND 1 OR INKEY(1) OR 10
AND 10 AND mazeX(x,y)=0 THEN y=y+1:flag=1
1820 : IF (INKEY) AND 1 OR INKEY(1) OR 10
AND 10 AND mazeX(x,y)=0 THEN y=y+1:flag=1
1830 : IF (INKEY) AND 1 OR INKEY(1) OR 10
AND 10 AND mazeX(x,y)=0 THEN y=y+1:flag=1
1840 : FOR x=2 TO 13
1850 : INK 6:10
1860 : REM
1870 : RETURN

```

```

1880 : flag=1
1890 : IF (INKEY) AND 1 OR INKEY(1) OR 10
THEN 1890:flag=1:IF 10 AND 10 THEN x=x+1:flag=1
1900 : IF (INKEY) AND 1 OR INKEY(1) OR 10
THEN 1890:flag=1:IF 10 AND 10 THEN x=x+1:flag=1
1910 : IF flag=1 THEN GOSUB 1200
1920 : IF (INKEY) AND 10 OR INKEY(1) AND 10
OR INKEY(9) OR 10 THEN GOSUB 2140:GOSUB
1930:GOSUB 2100:GOSUB 1870:GOSUB 1260
1940 : RETURN
1950 : REM check
1960 : IF ABS(x-y) < 25 THEN INK 15:(ABS(x
-y)=1)
1970 : IF ABS(x-y) < 25 THEN INK 14:(ABS(x
-y)=1)
1980 : IF 10 AND y=y THEN GOTO 1990
1990 : RETURN
2000 : REM Blank Disk
2010 : INK 12:0
2020 : FOR x=2 TO 13
2030 : INK 6:10
2040 : REM
2050 : RETURN

```

```

1300 REM FOUND Exit
1390 FOR a=1 TO 3000:NEXT a
1400 MOVE 0:GOTO 1300:GOTO 1400
1500 AFTER 10:GOTO 1500
1600 AFTER 10.1:GOTO 1600
1700 REM :
1800 LOCATE 5,3:PRINT "WELL DONE"
1900 LOCATE 4,10:PRINT "You found the"

2000 LOCATE 3,20:PRINT "in 1/1000ths of seconds."
2100 LOCATE 5,24:PRINT "IN 1/1000ths:PRINT
"PRESS ENTER TO PLAY"
2200 REM : INK 1,25
2300 col=1
2400 col=col+0.25:IF col=27 THEN col=
1
2500 IF INKEY(0)=1 THEN 2100
2600 RUN
2700 REM draw maze
2800 MODE 0
2900 FOR a=1 TO 25:FOR b=1 TO 25:LOCAT
E 31-b,10:IF maze%(a,b)=1 THEN PRINT
CHR$(207)
3000 NEXT b,a
3100 LOCATE 31-y,10:PRINT CHR$(249)
3200 REM LOCATE 31-by,5:PRINT "E" leave
out REM to show a rt. (cheat)
3300 LOCATE 1,25:PRINT " 3D Maze was
written by John T. Kennedy,CT dtd the SMI
Ts and MI the Music "
3400 IF INKEY(0)=1 THEN 2210
3500 IF INKEY(0)=1 THEN 2220
3600 MODE 0
3700 RETURN
3800 REM Tune Data. Thanks to Darren Iny
re. He has no doesn't want any more
3900 DATA 1911,1911,1517,1517,1432,1432,
1351,1276,1911,1911,1517,1517,1432,1432,
1351,1276,1911,1911,1517,1517,1432,1432,
1351,1276,956,1073,1276,1073,1276,1432,1
276,1517
4000 DATA 1432,1432,716,716,804,956,804,
716,1432,1432,716,716,804,956,804,716,14
32,1432,716,716,804,956,804,716,716,956,
804,400,1073,536,1204,612
4100 DATA 1911,1911,1517,1517,1432,1432,
1351,1276,1911,1911,1517,1517,1432,1432,
1351,1276,1911,1911,1517,1517,1432,1432,
1351,1276,956,1073,1276,1073,1276,1432,1
276,1517
4200 DATA 1276,1276,639,639,716,851,716,
639,1276,1276,1012,1012,956,956,912,851,
1432,1432,1136,1136,1073,1073,1912,956,1
7
4300 DATA 16,804,956,804,956,1073,956,1136
4400 SOUND 120:GOTO 4500
4500 SOUND 120:GOTO 4500
4600 SOUND 120:GOTO 4500
4700 SOUND 120:GOTO 4500
4800 SOUND 120:GOTO 4500
4900 SOUND 120:GOTO 4500
5000 SOUND 120:GOTO 4500
5100 SOUND 120:GOTO 4500
5200 SOUND 120:GOTO 4500
5300 SOUND 120:GOTO 4500
5400 SOUND 120:GOTO 4500
5500 SOUND 120:GOTO 4500
5600 SOUND 120:GOTO 4500
5700 SOUND 120:GOTO 4500
5800 SOUND 120:GOTO 4500
5900 SOUND 120:GOTO 4500
6000 SOUND 120:GOTO 4500
6100 SOUND 120:GOTO 4500
6200 SOUND 120:GOTO 4500
6300 SOUND 120:GOTO 4500
6400 SOUND 120:GOTO 4500
6500 SOUND 120:GOTO 4500
6600 SOUND 120:GOTO 4500
6700 SOUND 120:GOTO 4500
6800 SOUND 120:GOTO 4500
6900 SOUND 120:GOTO 4500
7000 SOUND 120:GOTO 4500
7100 SOUND 120:GOTO 4500
7200 SOUND 120:GOTO 4500
7300 SOUND 120:GOTO 4500
7400 SOUND 120:GOTO 4500
7500 SOUND 120:GOTO 4500
7600 SOUND 120:GOTO 4500
7700 SOUND 120:GOTO 4500
7800 SOUND 120:GOTO 4500
7900 SOUND 120:GOTO 4500
8000 SOUND 120:GOTO 4500
8100 SOUND 120:GOTO 4500
8200 SOUND 120:GOTO 4500
8300 SOUND 120:GOTO 4500
8400 SOUND 120:GOTO 4500
8500 SOUND 120:GOTO 4500
8600 SOUND 120:GOTO 4500
8700 SOUND 120:GOTO 4500
8800 SOUND 120:GOTO 4500
8900 SOUND 120:GOTO 4500
9000 SOUND 120:GOTO 4500
9100 SOUND 120:GOTO 4500
9200 SOUND 120:GOTO 4500
9300 SOUND 120:GOTO 4500
9400 SOUND 120:GOTO 4500
9500 SOUND 120:GOTO 4500
9600 SOUND 120:GOTO 4500
9700 SOUND 120:GOTO 4500
9800 SOUND 120:GOTO 4500
9900 SOUND 120:GOTO 4500
1000 SOUND 120:GOTO 4500
1010 SOUND 120:GOTO 4500
1020 SOUND 120:GOTO 4500
1030 SOUND 120:GOTO 4500
1040 SOUND 120:GOTO 4500
1050 SOUND 120:GOTO 4500
1060 SOUND 120:GOTO 4500
1070 SOUND 120:GOTO 4500
1080 SOUND 120:GOTO 4500
1090 SOUND 120:GOTO 4500
1100 SOUND 120:GOTO 4500
1110 SOUND 120:GOTO 4500
1120 SOUND 120:GOTO 4500
1130 SOUND 120:GOTO 4500
1140 SOUND 120:GOTO 4500
1150 SOUND 120:GOTO 4500
1160 SOUND 120:GOTO 4500
1170 SOUND 120:GOTO 4500
1180 SOUND 120:GOTO 4500
1190 SOUND 120:GOTO 4500
1200 SOUND 120:GOTO 4500
1210 SOUND 120:GOTO 4500
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1230 SOUND 120:GOTO 4500
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1280 SOUND 120:GOTO 4500
1290 SOUND 120:GOTO 4500
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1370 SOUND 120:GOTO 4500
1380 SOUND 120:GOTO 4500
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1460 SOUND 120:GOTO 4500
1470 SOUND 120:GOTO 4500
1480 SOUND 120:GOTO 4500
1490 SOUND 120:GOTO 4500
1500 SOUND 120:GOTO 4500
1510 SOUND 120:GOTO 4500
1520 SOUND 120:GOTO 4500
1530 SOUND 120:GOTO 4500
1540 SOUND 120:GOTO 4500
1550 SOUND 120:GOTO 4500
1560 SOUND 120:GOTO 4500
1570 SOUND 120:GOTO 4500
1580 SOUND 120:GOTO 4500
1590 SOUND 120:GOTO 4500
1600 SOUND 120:GOTO 4500
1610 SOUND 120:GOTO 4500
1620 SOUND 120:GOTO 4500
1630 SOUND 120:GOTO 4500
1640 SOUND 120:GOTO 4500
1650 SOUND 120:GOTO 4500
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1760 SOUND 120:GOTO 4500
1770 SOUND 120:GOTO 4500
1780 SOUND 120:GOTO 4500
1790 SOUND 120:GOTO 4500
1800 SOUND 120:GOTO 4500
1810 SOUND 120:GOTO 4500
1820 SOUND 120:GOTO 4500
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2080 SOUND 120:GOTO 4500
2090 SOUND 120:GOTO 4500
2100 SOUND 120:GOTO 4500
2110 SOUND 120:GOTO 4500
2120 SOUND 120:GOTO 4500
2130 SOUND 120:GOTO 4500
2140 SOUND 120:GOTO 4500
2150 SOUND 120:GOTO 4500
2160 SOUND 120:GOTO 4500
2170 SOUND 120:GOTO 4500
2180 SOUND 120:GOTO 4500
2190 SOUND 120:GOTO 4500
2200 SOUND 120:GOTO 4500
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2220 SOUND 120:GOTO 4500
2230 SOUND 120:GOTO 4500
2240 SOUND 120:GOTO 4500
2250 SOUND 120:GOTO 4500
2260 SOUND 120:GOTO 4500
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2800 SOUND 120:GOTO 4500
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2990 SOUND 120:GOTO 4500
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3010 SOUND 120:GOTO 4500
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3070 SOUND 120:GOTO 4500
3080 SOUND 120:GOTO 4500
3090 SOUND 120:GOTO 4500
3100 SOUND 120:GOTO 4500
3110 SOUND 120:GOTO 4500
3120 SOUND 120:GOTO 4500
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3140 SOUND 120:GOTO 4500
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3160 SOUND 120:GOTO 4500
3170 SOUND 120:GOTO 4500
3180 SOUND 120:GOTO 4500
3190 SOUND 120:GOTO 4500
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3510 SOUND 120:GOTO 4500
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3530 SOUND 120:GOTO 4500
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3560 SOUND 120:GOTO 4500
3570 SOUND 120:GOTO 4500
3580 SOUND 120:GOTO 4500
3590 SOUND 120:GOTO 4500
3600 SOUND 120:GOTO 4500
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3620 SOUND 120:GOTO 4500
3630 SOUND 120:GOTO 4500
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```

Programming: Atari

Graph program for Atari ST

by Wail Sabbagh

Graph-ST is a sophisticated program written for the Atari ST series, utilising two of the most prominent features of the ST computers: the mouse and graphics. It can prove to be useful for both home and small business users.

In short, Graph-ST is the numeric equiv-

alent of a word processor. After the data structure has been defined, users of Graph-ST can plot this data in several formats. Parts of the data can be plotted separately and highlighted and the data can be statistically analysed, edited and stored for later use. Graph-ST allows the

user to define up to five blocks of data where each block can be switched on or off during the plotting or analysis process. The program is also supported with a very comprehensive error detection routines.

Graph-ST is controlled by two menus. The first is concerned with defining the

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Programming: Peek & Poke



With Kenn Garroch

Amstrad Information

Hugh Mitchell Jnr, of Campbellown in Argyll, writes:

Q I am a 15 year old ZX Spectrum owner and have had this machine for three years. I find that it has too many limitations, eg. memory, storage, sound, etc. for my ambition to become a computer programmer/operator. I am considering buying an Amstrad CPC 6128 but would like a few things cleared up before I do.

Can Amstrad tape based software be transferred to disc on the 6128 without the need to buy an extra utility program, ie budget range software available on disc for the 6128 for under £5, and could you give me the address to write to for literature on the 6128 that will tell me about the features of the machine?

A The Amstrad 6128 does come with a utility to transfer software from cassette to disc but, it will not work with anything that is not Amstrad standard format ie most commercial software, games, etc.

Most budget software in the price range you mention would not be available on disc due to the high cost of Amstrad 3 inch discs. In any case, since all of the Amstrad machines use the 6128 as tape compatible, the software houses producing budget games probably won't bother producing them on disc for quite a while and almost certainly not for under £5.

For literature about the CPC6128, Amstrad's address is 169, King's Road, Brentwood, Essex. *Popular Computing Weekly* devotes a fair bit of space to the CPC machines, and there are four Amstrad-specific monthly magazines

available from newsagents.

Reading the Roms on the BBC

B Jennings, of Clwyd in, Wales writes:

Q Many things have been published about the BBC micro, but since I have only had mine for a year or so, there is one thing that I would like to do but don't know how. I want to read the contents of the Roms, to see what is in them.

A Reading the Roms is easy: the `QSRDM` routine (&FFB9) will return the contents of the address specified in locations &F6 and &F7, the Rom number in the Y register on entry to the routine. Try the following program:

```
10 QSRDM = &FFB9
20 INPUT "ROM No.: "; Y%
30 FOR T = &B000 TO &C000
40 7&F6 = T MOD 256
50 7&F7 = T DIV 256
60 A = USA(QSRDM) AND &FF
70 IF A > 31 THEN PRINT CHR$(A)
80 NEXT
```

Peek and Poke in video

A Hewlett, of Peldon, in Essex, writes:

Q I have been playing around with my MSX computer, and have come across the `VPEEK`, `VPOKE` commands. What I don't understand is why these are necessary and what they do.

A The difference between the way the MSX memory is set out, and the way most other machines do it is that the video Ram (VRam) and ordinary program Ram, are separate. The `VPEEK` and `VPOKE` commands are used to transfer data via the video chip, to the VRam. Another command, `Base`, is used to find the position of the various tables in the VRam, information about character sets, characters on screen, sprite definitions, col-

ours, and pixels for hi-res. From Basic, there is not really the need to use the VRam directly, unless you want to put characters directly on to the screen.

The advantage, in theory, of having separate video memory, is that the processor doesn't have to spend time accessing it. All it does is send commands to the controller chip which does the work for it. In practice, most high speed graphics applications need to access the video Ram as fast as possible, and this means directly. So, trying to do fast, fancy machine code graphics on the MSX is quite difficult.

Buying advice for games players

M Poleman, of Selby, in Yorkshire, writes:

Q I am thinking of buying a home computer, mainly to play games, which one would you recommend? I don't want to spend too much money, so is there any value in buying second hand?

A You have more or less, three possible choices, Spectrum, Amstrad, and Commodore. Of these, the C64 and the Spectrum probably have the most games software available although, they are both getting a little long in the tooth. The C64 costs around £150 and the Spectrum Plus £95 when bought new. With these, you will need some kind of monitor, or TV, and the Spectrum needs a cassette deck (The Commodore, at the moment, comes in a package with the cassette included). If you have a cassette player and TV sitting idle, the Spectrum is probably the cheapest option. If, however, you are thinking of using your computer for programming, or business, the Amstrad 6128 and C64 plus disc drive deserve a good look.

As a game playing machine with a great deal of business software available, the C64 is reasonably good, if a little ex-

pensive (£160 for a disc drive). The Amstrad scores over the other two in the value for money department. As you probably know, it comes complete with disc drive and monitor. The green screen version is £299, the colour £100 more expensive at £399.

What you need to do is decide whether you will only be using the machine for playing games or, whether, sometime in the future, you want to expand your horizons and do a little programming or wordprocessing. The best allround machine is the Amstrad and though, at the moment, there is not as much software available as for the other two machines, the situation definitely seems to be improving.

You may well, however, want to wait a bit before buying either the C64 or the Spectrum, since new versions of both are due to be launched this autumn. The new C64 is essentially a redesigned C64, with some additional operating software. The forthcoming Spectrum Plus 2, to be released by the machine's new owner, Amstrad, will probably have a tape deck built in.

As far as buying a second hand machine goes, the prices are probably not that much cheaper, and unless the offer is a bargain (lots of software, add-ons, etc. thrown in), you might as well buy new and have some kind of guarantee.

Game pokes put simply

G A Atkinson, of Radford in Nottingham, writes:

Q I have a Spectrum 128 and lots of games, and I would like to know how to use the Pokes for games, as seen in magazines.

A Well, if you really must cheat then put your Spectrum into 48K mode (assuming it's not a 128K game) and follow the instructions given in the magazines. This is usually a matter of typing in the program given and running it. What the program does is load the game into memory but not execute it. Various operating parameters are then altered with the pokes, and the game is run with `Randomise User`.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem **Peek It to Kenn Garroch** and every week he will **Poke** back as many answers as he can. The address is **Peek & Poke, PCW, 12-13 Little Newport Street, London WC2R 3LD**



The intelligent modem and how it works

David Wallin completes the two-part modem series

An intelligent modem is literally a modem with built-in intelligence. Intelligent modems contain their own micro-computer. This consists of a microprocessor, a Rom and often Ram as well.

The cpu and Rom control the modem's functions. This means two things. First, an intelligent modem will work with almost any computer that has the necessary RS232 pins. Secondly the modem can operate without the computer attached/switched on.

The Ram is used for two things, *speed buffering*, and number directories. A number directory is just a list of numbers and service-names, and the modem can autodial directly from the list without the number having to be entered.

Speed buffering means that a computer that can't handle split speeds (speeds like 1200/75 where Rx and Tx are different) can still connect to a service that requires split speeds (such as Prestel).

Hayes and V25 bis

When talking to the modem, you actually use a language or protocol; the most common, and oldest, is Hayes. This was devised by the American company Hayes Microcomputer Products. There are many Hayes compatible modems on the market, although some are more compatible than others. The CCITT standard protocol for talking to an intelligent modem has the awkward name of V25 bis. The commands are more awkward than the Hayes ones as well. Some companies have their own protocols, such as the DaCom protocol. Usually these protocols are easier to use and are 'better suited' to the individual modem than V25 bis or Hayes.

There are many places of communications software available for intelligent modems. Before buying, you should first check that the modem uses the correct protocol for the software. Then you should also check on just how Hayes or V25 bis compatible your modem is. It may not be a full enough implementation for the software. The software manufacturers should be able to tell you if your modem will work.

When you talk to the modem you have to set up your terminal software to put you on-line and set up a certain baud rate and word length, etc (annoyingly the world length, start/stop bits and parity are also called the protocol). Some modems can sense how this is set up automatically and

some require you to tell the modem how it is set up by altering DIP switches. The baud rates you can talk to the modem at are called the *Terminal Baud Rates* and the method of sensing is called the *Terminal Baud Rate Setting* (Manual by DIP switches or automatic).

The automatic sensing modems require you to send them a few characters (usually 3 or 4 plus signs on Hayes and a few

asterisks on V25 bis). As they know the Ascii value of the character they can work out what speed, etc, that the RS 232 is working at.

Below is a list of four of the best known intelligent modems. There are many others including the WS4000, a sub £150 Hayes modem which has been announced but not yet launched! I'll bring you up to date on that as soon as I can.



One of the intelligent modems: the WS3000

Name	Im512	WS3000	DBL 2123-AD	DBL 2123-OT
Size (cm)	15 x 3 x 25	16 x 4 x 24	20 x 3 x 21	22 x 6 x 21
Weight	900g	750g	5700g	830g
Power supply	Internal	External	External	External
Modem	V21, V23 mode 2, 1200/1200 1/2 duplex	V21, V23 mode 1, V23 mode 2, Bell 103, Bell 202, 1200/1200 1/2 duplex	V21, V23 mode 2	V21, V23 mode 2
Controls	On/Off	Reset	Reset	V21/23, ORIG/ANS
RS 232 pins	2-7,20	1-10,16,20,22-25	1-10,20,22	1-10,20,22
Terminal baud rates	1200, 2400, 4800, 9600	300, 600, 1200, 2400, 1200/75	300, 1200	300, 1200, 2400, 9600
Terminal baud rate setting	Auto	Auto	Auto	Dip switches
Protocols	V25 bis	Hayes	DaCom	DaCom
Number store	8	62	32	32
Autodial method	Menu/by number	Menu/by number	Menu (keyword)/by number	Menu (keyword)/by number
Other features	Auto-logon, speaker, Dial tone detect, TTL input	Speaker, Printer port, Ringback, auto-answer	Dial tone detect	ARQ, ACI, auto-logon
Options	Hayes, EPAD	V22, V22 bis, security		
Manufacturer	Tandata Marketing Ltd, Albert Road North, Malmesbury, Wiltshire, W14 2TL (06845) 66421	Miracle Technology Ltd, St Peters Street, Ipswich, Suffolk, IP1 1XB (0473) 216147	DaCom Systems Ltd, Sunrise Parkway, Lintford Wood, Milton Keynes, MK14 9LU (0908) 675511	DaCom Systems Ltd, Sunrise Parkway, Lintford Wood, Milton Keynes, MK14 9LU (0908) 675511
Prices (inc. VAT)	Standard: £255 Hayes: £265 EPAD: £339	Standard: £339	Standard: £401	Standard: £573

A look at the latest in sound systems

Mark Jenkins with news from the world of micro music . . .

Before going any further, it's worth pointing out that this week's Atari supplement contains a review of the most powerful micro music package about at the moment, the Steinberg, Pro 24 system for the 520ST and 1040ST.

But on to more affordable systems, such as Supersoft's Microvox monophonic sampler for the Commodore 64. It's Midi-compatible, so sounds can be played either from the computer keyboard or from a synth or sequencer.

"The second disc allows you to build up funky brass riffs"

Microvox offers very high quality and several additional features such as echo and pitch shifting. Recently Supersoft issued a set of sampled sounds on disc for the system, and we've now had a chance to assess them in detail.

The package offers 123 sound comprising 6,502 blocks spread over five double-sided discs - Orchestral and Strings, Wind and Brass, Guitars and Bases, Drums and Percussion, Keyboards and Miscellaneous. The loading time alone for that little lot comes to a couple of hours, so we've had to skip through to some extent!

The first disc contains a good selection of string instruments played in various styles - plucked, bowed and so on - plus some of the familiar orchestral "crashes" without which no sample library would be complete. The second disc also offers some crashes, this time on brass instruments, allowing you to build up powerful-sounding funky brass riffs. Guitars and Bases includes everything from electric guitar chords to clean, single picked notes and Drums and Percussion includes a wide selection of acoustic and electronic sounds accessed from different keys or different Midi channels, so this selection may be one of the most used.

At £29.95 the sound library represents excellent value for money (the whole system is around £200 depending on whether the software is on disk or cartridge), but a couple of improvements could be made in the future. For instance, most of the sam-

ples intended for musical playing are taken from musical instruments - no metal sheets or blowing over the top of a bottle - while most of the effects sounds are limited to just that - cash registers, dogs barking, breaking glass and so on. Still, the imaginative home recordist could go about correcting those omissions himself.

A letter from J Leplat of South London opens up a few questions about programming for Midi interfaces. "I recently managed to buy a Korg DW8000, Commodore 64, Midi Interface and a 12-track studio program which isn't very user-friendly. Could I write my own programs such as a sound editor, since speed isn't important for that kind of program? The interface instructions don't help at all - could you help?"

"The modern packages are vastly sophisticated"

What Mr/Ms Leplat has here is an early Jellinghaus (JMS) Midi program, one of the first to come onto the market, and not terribly well executed. It should be relatively easy to improve on such a program if you know the correct way to address the expansion port (see the *Programmer's Reference Guide*). The only problem after you've worked out how to do that, is that you won't know what Midi information the synthesizer is expecting. If you simply want to play notes in sequence, all you need is the Sequential Circuits Official Midi Specification which will allow you to look up the standard codes for Note On, Note Off, Velocity and so on (all this is reproduced in my *Electronic Music for the Commodore 64* book published by Sunshine).

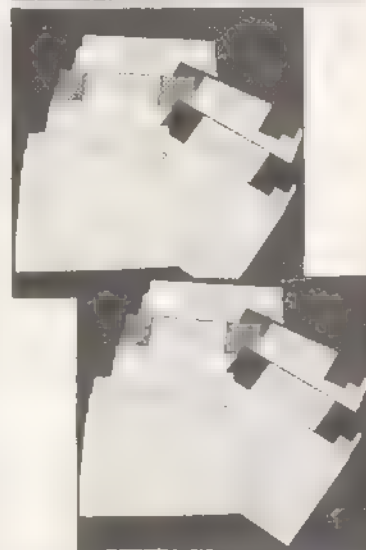
But if you want to edit sounds on the DW8000 you'll need to find its individual System Exclusive codes, which Korg aren't likely to reveal to anyone except established software-producing members of the Midi Manufacturers' Association. In any case, it isn't safe to assume that a slow-running Basic program will be able to

cope even with sound editing functions, since Midi is very fussy about the speed at which it receives information.

The clincher is the fact that the professional software houses have been working hard on Midi applications over the two years or so since the first JMS programs were released, and modern packages are vastly more sophisticated than the amateur programmer can match. If anyone would be interested in a circuit for a Midi interface with some experimental software, let us know - but for the moment, it's best to stick with professional packages such as those from Steinberg, who should have a C64 Editor package for the DW8000 before long.

Next week, a look at Supersoft's Rhythm King drum machine for the Commodore 64, with some software for the Amstrad sound chip coming up.

If you have any queries or tips for this column, please write to Mark Jenkins at Popular Computing Weekly, 12-13 Little Newport Street, London WC2H 7PP. Mark would also welcome examples of your own music on audio or program tape, or disc.



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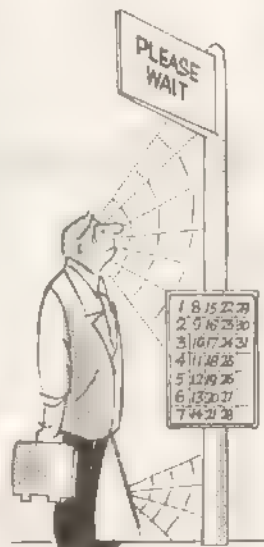
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New Releases

John Cook looks through this week's new arrivals

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Program The Boggit Type Adventure/Humour Micro Amstrad **Price** £7.95 **Supplier** CRL, 9 Kings Yard, Carpenters Road, London E15

Program Breakpoint Type Utility Micro Amstrad **Price** £14.95 **Supplier** Melbourne House, 60 High Street, Hampton Wick, Kingston-upon-Thames, Surrey.

Program Cauldron II - the Pumpkin Strikas Back Type Arcade Adventure Micro Amstrad **Price** £8.99 **Supplier** Palace Software, 275 Pentonville Road, London N1 9NL.



Program Jewels of Darkness Type Adventure Micro Amstrad **Price** £14.95 cassette, £19.95 disc **Supplier** Level 9/Rainbird, address above.

Program Knight Games Type Arcade/Simulation Micro Amstrad **Price** £8.95 cassette £14.95 disc **Supplier** English Software, 1 North Parade, Parsonage Gardens, Manchester M6Q 1BX.

Program Monsters of Murdac Type Adventure Micro Amstrad **Price** 7.95 cassette, £14.95 disc **Supplier** Global Software, PO Box 67, London SW11.

Program Nexus Type Arcade Adventure Micro Amstrad **Price** £9.95 **Supplier** Nexus, DSB House, 30 The High Street, Beckenham, Kent BR2 0XW.

Program Room Ten Type Arcade Micro Amstrad 664/6128 **Price** £14.95 **Supplier** CRL, address above

Program Very Big Cave Type Adventure Micro Amstrad 664/6128 **Price** £14.95 (disc only) **Supplier** CRL, address above.

Atari XL/XE

Program Ninja Type Arcade/Simulation Micro Atari 400/800 **Price** £2.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2A.

C16/Plus/4

Program King Size Turbo Tape Type Utility Micro C16/Plus/4 **Price** £4.95 **Supplier** Robtek, address above

Program King Size Turbo Text Type Utility Micro C16/Plus/4 **Price** £4.95 **Supplier** Robtek, address above

Program King Size Turbo Base Type Utility Micro C16/Plus/4 **Price** £4.95 **Supplier** Robtek, address above.

Program Trizons Type Arcade Micro C16/Plus/4 **Price** £2.99 **Supplier** Bubble Bus, 87 High Street, Tonbridge, Kent TN9 1RX.

Program Tazz Type Arcade Micro C16/Plus/4 **Price** £2.99 **Supplier** Bubble Bus, address above.

Commodore Amiga

Program The Pawn Type Adventure Micro Amiga **Price** £24.95 **Supplier** Rainbird, 74 New Oxford Street, London WC1A 1PS.

Commodore 64/128

Program 3D Golf Type Simula-

Pick of the week

Druid - It's a winner

Program Druid Type Arcade Adventure Micro Commodore 64/128 **Price** £7.95 **Supplier** Firebird, 74 New Oxford Street, London W1.

There have been many attempts at producing an arcade version of *Swords & Sorcery*, *Dungeons & Dragons* games, but with limited success. Now comes *Druid*, a superb release from Firebird, which combines fast, arcade action, with the monsters and spell-casting of a role-playing game.

The obvious attraction of *Druid* is its superb graphics - solid, colourful characters, nicely animated. But beyond this, the gameplay is, to coin a phrase, wizard.

Your adversaries include ghosts, beetles, demons and sundry other malevolent types who must be disabused of their evil notions by the violent application of magic spells.

Different foes are suscep-

tible to different types of magic. You need to work out which are which.

You'll also need to find key spells to open doors, and chaos spells which are like old-technology smart bombs.

Invisibility spells will come in useful, as will golems. A golem is a magic servant who will do your bidding. It is highly resistant to damage so you can use it to clear out tricky rooms, or to guard your back.

It is possible to control the golems yourself but this involves very fast manipulation of keyboard and joystick. Far better to employ a willing friend on a spare joystick.

Far more than just an arcade zap, *Druid* requires fast reflexes, a good memory and puzzle-solving skills.

Initially for the Commodore 64, *Druid* will be converted for the Spectrum and Amstrad. Keep an eye open for it - it's a winner.

tion Micro Commodore 64 **Price** £2.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2A.

There has, of course, been a rash of golf and cricket games lately. Summer, I suppose. Here's another.

Sadly, we're really scraping the barrel now. While we can't expect all of Mastertronic's games to be up to the standard of *The Last V8*, or *Spellbound*, *3D Golf* represents a wasted effort.

Too much time has been spent on making the golfer walk from his trolley to the ball, and not enough on making the game playable.

The graphics are rather nice, but everything is seen from behind the golfer. This means you have no idea how far from the hole you are.

Furthermore, the animation of the ball in flight is really quite laughable.

Following in the fairways of Ariolasoft's excellent *Golf Construction Set*, and US Gold's even better *Leader Board*, *3D Golf* is left in the bunker.

Program Filemaster Type Utili-

ty Micro Commodore 64/128 **Price** £29.95 **Supplier** Robtek, Unit 4, Isleworth, Middlesex

Program Iridis Alpha Type Arcade Micro Commodore **Price** £8.95 **Supplier** Hewson/Llamasoft, 56B Milton Trading Estate, Milton, Abingdon, Oxon, OX14 4RX.

Jeff Minter games invite superlatives which can't be applied to the output of other programmers; such as hoopy, zarjaz, well cosmic and far out ma-a-a-an. All the above certainly apply to *Iridis Alpha*, which is a sort of mutant *Defender* played on two mirrored planet surfaces at once.

Your Gilby Fighter is capable of flying through space zapping the alien defenders of *Iridis Alpha*, or of becoming a scuttling land-crab craft. Your task is to keep the energy balance of the two planets level, and to feed the planetary core enough energy to boost you through a warp gate to the next level.

Iridis Alpha features lots of the usual Minter specialities; noisy sound effects, weird sprites, incredibly fast action and non-stop zapping.

With a gamelet in pause mode, a cosmic bonus routine featuring flying eyes, and a promised pseudo-random music generator on the way, the 200-level *Iridis Alpha* is a shoot-'em-up without the "mindless". As the first release on the Hewson/Llamosoft label, it promises good things to come from Minter, who is still able to take a simple idea - in this case, a basic *Defender*-style game - and transform it into another classic arcade program.

Program King Size Type Compilation **Micro** Commodore 64 (only) **Price** £4.95 **Supplier** Robtek, Unit 4, Isleworth Business Complex, St John's Road, Isleworth, Middlesex.

Program Jewels of Darkness Type Adventure Micro Commodore 64 **Price** £14.95 cassette and disc **Supplier** Level 9/Rainbird, 74 New Oxford Street, London WC1A 1PS

Program Very Big Gave Adventure Type Adventure Micro Commodore 64 (disc) **Price** £12.95 **Supplier** CRL, address above.

Program Rocky Horror Show Type Arcade Adventure Micro Commodore 128 (enhanced) **Price** £9.95 cassette, £14.95 disc **Supplier** CRL, 9 Kings Yard, Carpenters Road, London E15

MSX

Program King Size Type Compilation **Micro MSX Price** £4.95 **Supplier** Robtek, Unit 4, Isleworth, Business Complex, Isleworth, Middlesex.

PCW 8256/8512

Program Jewels of Darkness Type Adventure Micro PCW 8256/8512 **Price** £19.95 **Supplier** Rainbird, 74 New Oxford Street, London WC1A 1PS.

Program Monster of Mordac Type Adventure Micro PCW 8256/8512 **Price** £19.95 **Supplier** Global Software, PO Box 67, London SW11

Program SAS Raid Type Arcade Micro PCW 8256 **Price** £14.95 **Supplier** CRL, 9 Kings Yard, Carpenters Road, London E15.

don E15.

SAS *Raid* has a scenario where logic goes, in true SAS style, out of the window. It's like this you see, vitally important plans have been filched and if someone doesn't get them back then, shock horror, your base will be wiped out within the hour.

For some reason knowing where and when the attack will take place avails you not and even worse, instead of sending out a squad of the lads to do the business you have to go it alone.

The game involves moving, and I use the word reluctantly as nothing is animated here, your stick insect figure through the game collecting objects and avoiding patrols as you seek to recover the stolen plans.

Graphically, *SAS Raid* is so crude that it would look poor on a ZX81 and as a game it is only marginally more exciting than a blank disc.

Sinclair QL

Program Nucleon Type Utility

Micro QL Price £19.95 **Supplier** Pyramide Reo Promotions, 28 Waverley Grove, London N3

Spectrum

Program 3D Golf Type Simulation Micro Spectrum Price £2.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2A (01-377 6880).

Program Cauldron II - the Pumpkin Strikes Back Type Arcade Adventure Micro Spectrum Price £8.99 **Supplier** Palace Software, 275 Pentonville Road, London N1.

Program Lap of the Gods Type Arcade Micro Spectrum 48K Price £1.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2A (01-377 6880).

Program Octagon Squad Type Arcade Micro Spectrum 48K Price £1.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2A (01-377 6880).

Program Spellbound 128 Type Micro Spectrum 128 Price £2.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2A.

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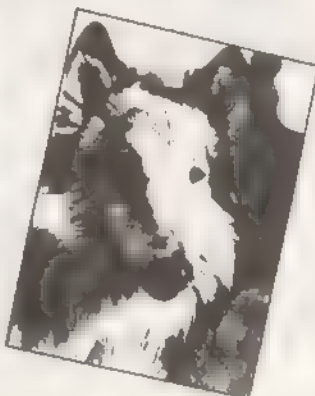
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DESCRIPTION OF DIGITISER

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The video digitiser consists of a compact plug-in interface attached to the Spectrum and a set of software.

It is fully compatible with Microdrive units and allows you to transfer any stationary video picture onto your computer screen.

USES

If you are writing your own games, this is for you. The system will put professional digitised pictures into your games directly from your posters or video film.

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TECHNICAL DESCRIPTION

The digitiser will operate with any 625 line composite video output, e.g. as from video camera, or video recorder on a 1" frame. Digitises a full 256 x 192 x 4 bit picture. Displays this on your computer screen. Automatic adjustment of levels for best use of incoming video signal. The selection of slice and gate levels, can be made after digitising to achieve the best picture. Pictures may be dumped to cassette or microdrive for use in your own programs. In with one of the spectrum drawing programs. Fully menu driven and very simple to use, supplied with a comprehensive manual. Amstrad version available soon.

Top Twenty

- 1 (2) Leaderboard
- 2 (1) Ghosts and Goblins
- 3 (4) Green Beret
- 4 (3) Kung Fu Master
- 5 (5) Jack The Nipper
- 6 (6) Ninja Master
- 7 (8) Kik Start
- 8 (16) Knight Games
- 9 (7) Molecule Man
- 10 (13) Thrust



- 11 (11) ACE
- 12 (12) Knight Tyme
- 13 (-) Theatre Europe
- 14 (9) Formula One Simulator
- 15 (-) Commando
- 16 (-) Tau Ceti
- 17 (10) Speed King
- 18 (19) Bomb Jack
- 19 (-) Kane
- 20 (14) Way Of The Tiger

US Gold
Elite
Imagine
US Gold
Gremlin Graphics
Firebird
Mastertronic
English
Mastertronic
Firebird



Leaderboard goes back to number one

Cascade
Mastertronic
PSS
Mastertronic
Elite
CRL
Mastertronic
Elite
Mastertronic
Gremlin Graphics

Top Tens

Amstrad

- 1 (-) Ghosts and Goblins (Elite)
- 2 (3) Kane (Mastertronic)
- 3 (7) Harvey Headbanger (Firebird)
- 4 (2) Elite (Firebird)
- 5 (6) Green Beret (Imagine)
- 6 (4) Molecule Man (Mastertronic)
- 7 (8) Storm (Mastertronic)
- 8 (9) Radzone (Mastertronic)
- 9 (-) Winter Games (Epyx/US Gold)
- 10 (-) Jack the Nipper (Gremlin)



Green Beret - consistently near the top

Figures compiled by Gallup/Microscope

Commodore 64

- 1 (1) Leaderboard (US Gold)
- 2 (4) Green Beret (Imagine)
- 3 (2) Ghosts and Goblins (Elite)
- 4 (5) Knight Games (English)
- 5 (8) Thrust (Firebird)
- 6 (6) Ninja Master (Firebird)
- 7 (3) Speed King (Mastertronic)
- 8 (-) Tau Ceti (CRL)
- 9 (-) Solo Flight 2 (US Gold)
- 10 (10) Bump Set Spike (Mastertronic)

Atari

- 1 (2) Kik Start (Mastertronic)
- 2 (-) Vegas Jackpot (Mastertronic)
- 3 (1) Bear Belly (Americana)
- 4 (5) Last V8 (Mastertronic)
- 5 (-) Warriors of Ras (US Gold)
- 6 (-) One Man (Mastertronic)
- 7 (-) Mercenary (Novagen)
- 8 (9) New York City (Americana)
- 9 (-) Action Biker (Mastertronic)
- 10 (-) Second City (Novagen)

BBC

- 1 (1) Thrust
- 2 (4) Commando
- 3 (2) Air Wolf
- 4 (5) Cricket
- 5 (3) Tennis
- 6 (-) Ian Botham
- 7 (-) Winter Olympics
- 8 (7) Star Force 7
- 9 (-) Repton 2
- 10 (-) Citadel

Spectrum

- (Superior)
 - (Elite)
 - (Elite)
 - (Bophyll)
 - (Bophyll)
 - (Tynesoff)
 - (Tynesoff)
 - (Bophyll)
 - (Superior)
 - (Superior)
- 1 (2) Kung Fu Master (US Gold)
 - 2 (1) Jack the Nipper (Gremlin)
 - 3 (3) Ghosts and Goblins (Elite)
 - 4 (6) ACE (Cascade)
 - 5 (4) Ninja Master (Firebird)
 - 6 (5) Molecule Man (Mastertronic)
 - 7 (-) Theatre Europe (PSS)
 - 8 (8) Knight Tyme (Mastertronic)
 - 9 (-) Bobby Bearing (The Edge)
 - 10 (10) Green Beret (Imagine)

NEXT WEEK

GEOS — a full review

GEOS is the operating environment bundled with Commodore's new C64C, providing the redesigned 64 with easy to use graphics, from *GEO Paint*, and multiple font word processor, *GEO Write*.

Popular brings you the first full review of the latest version of GEOS, in a special colour two-part article.



Further steps in C

If our introductory languages series interested you, take a look next week, when Leon Heller takes his explanation of C a bit further, with a terminal emulation program to type in.

Programming

Mark Butler explains how to use Spectrum subroutines, plus two games to type in: *UXB* on the Spectrum, and *Space War* on the BBC.

The Hackers

Security is VITAL here. We daren't keep all our hardware in the one place.



...so, our terminal keyboards are all kept in this room...



& the VDUs are in another building 1/2 a mile up the road.



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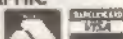
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"... Incredibly easy to use. The end result is as good as anything I've heard this side of the Amiga." ... POPULAR COMPUTING WEEKLY

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